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4301 JONES BRIDGE ROAD
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Name of Candidate: Diane M. Reddy
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Diane M. Reddy
Department of Medical Psychology
Uniformed Services University
of the Health Sciences

Abstract

Title of Dissertation: Predictors of Breast Self-Examination Proficiency

Diane M. Reddy, Doctor of Philosophy, 1984

Dissertation directed by: Sheryle W. Alagna, Ph.D., Department of Medical Psychology

Breast self-examination (BSE) is an alternative to existing breast cancer screening methods for increasing early detection and reducing mortality from this disease. Because BSE has many advantages it has been widely promoted. Despite educational efforts, few women practice BSE proficiently on a monthly basis. Consequently, two important questions are: (1) What factors predict proficient BSE technique? (2) What variables predict frequent BSE practice? A series of studies were conducted focusing on these two concerns. In each, subjects completed a questionnaire and performed a breast examination on breast models with known tumors. This dissertation reports findings from one of these studies in which predictors of proficient BSE technique and successful tumor detection were identified. The effects of race (black versus white), breast symptomatology history (benign breast problems versus no history of breast problems) and breast examination type (technique proficiency evaluated on a breast model versus on oneself) on BSE performance and attitudes toward BSE were also investigated. Data were obtained from a sample of 66 women visiting a gynecological clinic for routine pelvic examina-

tions or minor symptoms unrelated to the breast. Regression analyses revealed that technique proficiency was the best predictor of tumor detection. Stronger preferences for behavioral involvement in health action as measured by the Health Opinion Survey (Krantz, Baum, and Wideman, 1980), and more frequent BSE practice respectively also contributed significantly to explaining tumor detection. The only predictor of proficient BSE technique was personal confidence about performing BSE. The type of examination anticipated and performed by subjects had no effect on their BSE performance or attitudes toward BSE and breast cancer. Race and breast symptomatology history also had no effect on BSE proficiency, although symptomatic women reported practicing BSE more frequently than asymptomatic women. Knowledge of BSE and breast cancer were the only variables found to differentiate black women from white women, with black women scoring lower than white women. Personal confidence about performing BSE appears to be an important determinant of BSE proficiency. Further research needs to examine the effectiveness of more psychologically oriented interventions that build confidence in BSE in increasing BSE proficiency and frequency.

PREDICTORS OF BREAST SELF-EXAMINATION PROFICIENCY

by

Diane M. Reddy

Dissertation submitted to the Faculty
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Forward

Health problems have long been of interest to psychologists, but only recently has a separate American Psychological Association division (Division 38, Health Psychology) and new journal, Health Psychology, been established. The reasons for this are several. Funding sources have turned their attention to "health" and wellness as opposed to focusing on disease treatment. There has also been a shift in the major health problems confronting individuals in the United States. With improved sanitation and the development of immunizations infectious diseases such as smallpox are no longer major causes of mortality. Rather cancer, coronary heart disease and other chronic illnesses are now primary killers. Psychologists, with their knowledge of persuasion, learning, and the like, can contribute to understanding why people do and do not act in their own best interest with respect to health and can also help to develop interventions to induce people to change maladaptive behaviors and adopt more healthful lifestyles.

One important example is early detection of breast cancer. Since breast cancer survivability is intimately linked to early detection and treatment, and early detection is contingent upon periodic clinical screenings for breast cancer and frequent and proficient self-examination, psychologists can contribute to reducing breast cancer mortality by identifying factors that relate to these beha-

viors.

This dissertation focuses on breast self-examination (BSE), a self-initiated action for the early detection of breast abnormalities. The first section provides background information and reviews research findings on BSE and practical problems related to breast cancer and its detection. Research needs are discussed, a model of BSE behavior is proposed, and the specific hypotheses tested in this study are detailed.

Chapter two describes the methodology used in this study and the demographic characteristics of the women who participated. Chapter three discusses the development of the questionnaire and the behavioral checklist used in this study and the rationale for selected measures, while Chapter four reports the study results. In the final chapter, major findings are discussed in greater detail and directions for future research are suggested.

Acknowledgement

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Chapter One - Background

Breast cancer kills more women in midlife (ages 35 to 50) than any other disease. Overall, it ranks second as the leading cause of mortality among women in the United States (American Cancer Society, 1982), with one woman out of every 14 developing this disease at some time in her life (National Cancer Institute, 1980).

Mortality from breast cancer has not been significantly reduced in the last forty years (Fox, 1978). This is due to the fact that the standard treatment for breast cancer is surgery. Currently, it is recognized that surgical treatment cures only those patients whose cancer is confined to the breast and surrounding tissues, and only 25 percent of women with breast cancer fall into this category (Cope, 1978). In the majority of cases, breast cancer has metastasized to sites distant from the breast before mastectomy is performed (Cope, 1978). Treatments involving radiation therapy and chemotherapy are currently being evaluated in this context. While significant progress in understanding breast cancer has been made, <u>prevention</u> is not yet a reality. Consequently, <u>early</u> <u>detection</u> remains the only means to reduce breast cancer mortality.

Although breast tumor size alone does not distinguish early from more advanced disease, women presenting with large tumors at the time of initial treatment can be expected to have more metastases, more recurrences and higher mortality from breast cancer than those with smaller

tumors (Adair, Berg, Jobert, and Robbins, 1974; Fisher, Slack, and Bross, 1969; Haagensen, 1971; Spratt and Donegan, 1967). Other prognostic factors include histological type of cancer, host resistance, tumor growth rate, patient age, and type of surgery. Nonetheless, breast cancer tumor size is a primary prognostic predictor (Hall, 1977). In general, the detection of breast tumors when they are small offers maximum expectations for long term survival.

Three major approaches to early detection of breast cancer are currently in use: mammography, clinical examination, and breast self-examination (BSE). In mammographic techniques, a photograph of the breast is taken by passing x-rays through breast tissues. The resulting image is recorded on film or paper. Mammography is usually reserved for diagnosis rather than routine screening because of the health risks posed by accumulated exposure to x-rays. Clinical breast examination, and self-examination, involve inspection of the breasts and palpation. Among these, monthly BSE is most suitable for general adoption since it is a simple technique that requires no special equipment and only a minimum time commitment. It is also cost free, poses no health risk, can be performed conveniently at home, and can be combined with periodic clinical and mammographic examinations. Further, most studies have concluded that BSE is efficacious. Women who report practicing BSE have been shown to have smaller tumors at diagnosis and to survive longer than nonperformers (Feldman, Carter, Nicastri, and Hosat, 1981; Huguley and Brown, 1981;

Foster, Lang, Costanza, Worden, Haines, and Yates, 1978; Greenwald, Nasca, Lawrence, Horton, McGarrah, Gabriele, and Carlton, 1978). In one recent study, (Foster and Costanza, 1984), more frequent BSE was associated with less delay from first symptom to diagnosis, earlier clinical stage, smaller tumor size, and fewer axillary node metastases. At a five year follow-up, mortality was 14 percent for BSE performers versus 26 percent for nonperformers. This survival difference was significant after adjusting for age, method of detection, family history of breast cancer and delay in seeking treatment. There are at least two additional reasons favoring adoption of BSE. First, BSE and clinical examination have been found to be more useful than mammography in detecting breast cancer in compact, dense breast tissue characteristic of women under forty-five (Lesnick, 1977). Second, from a cost perspective, BSE has advantages over clinical examination since doubling rates of some breast cancers warrant examination every three months. Finally, other evidence suggests that the palpation skills necessary for proficient BSE can be easily learned (Hall, Adams, Stein, Stephenson, et al., 1980; Stephenson, Adams, Hall, and Pennypacker, 1979; Adams, Hall, Pennypacker, Goldstein et al., 1976).

Because of its many potential advantages, BSE has been widely promoted as an adjunctive screening procedure even though no randomized trial has been conducted to document its efficacy[1]. Most sources recommend that BSE be

practiced monthly so that it becomes a habit and breast changes may be detected early. Despite educational efforts by the American Cancer Society and the National Cancer Institute to promote BSE, few women practice it often enough to detect malignancies as soon as palpation permits (American Cancer Society, 1980; National Cancer Institute, 1979).

Past Research

The literature on BSE has proceeded along two lines. First, research focused on describing women's knowledge of BSE and breast cancer, and current practice. BSE practice as a dichotomous outcome (practice, no practice) and BSE frequency (the number of times BSE is practiced within a given interval) have been the primary current practice variables studied. A few recent studies have departed from this tradition by examining BSE technique proficiency (competence in performing BSE as measured by observed performance) as well as frequency. The second major thrust in the literature has been to identify correlates of BSE practice.

Recent information on the level of knowledge among women in the United States pertaining to BSE and breast cancer is not available since large-scale studies addressing these issues have not been conducted in nearly a decade. For the same reasons, definitive information on the number of women who have ever tried BSE or currently perform it on a regular, monthly basis is unavailable. The information that is current is limited mostly to small

samples in which different measures of knowledge and practice were examined, making comparisons over time and across studies difficult. It is known from the 1974 Gallup survey that most women at that time were not knowledgeable about breast cancer. More recent studies have reported greater knowledge of breast cancer signs and risk factors (Stillman, 1977; Crosson, Nessel, Engstrom, and Grover, 1978). There appears to be substantial public awareness of BSE as a detection procedure for breast cancer (Alagna and Reddy, 1984), although many women lack knowledge of the specific behaviors necessary to adequately perform BSE.

Because only small samples provide recent information on BSE frequency caution must be used in drawing conclusions about the number of women who currently practice BSE in the United States. Examination of these data reveals considerable variability in the rates of reported BSE frequency. Part of this variability may be explained by sample differences. For example, some studies (e.g., Stillman, 1977) have examined BSE frequency among nursing students, while others (e.g., Celentano, 1983) have sampled telephone-serviced metropolitan households. It is not surprising that higher rates of practice are found among student samples who presumably have had more contact with the technique than women in the general population. Variability in the rates of reported BSE may also be due to the fact that some women deliberately distort their reports of practice because of the desirability of stating that one

engages in a positive health behavior such as BSE. Memory errors also may contribute to this variability when retrospective reports are used. In any case, it has been estimated that less than 25-30 percent of the women in the United States practice BSE monthly.

Because of the growing recognition that the quality of a woman's BSE is important and not synonymous with reported frequency, a few recent studies have begun to investigate BSE proficiency (Howe, 1980; Alagna and Reddy, 1984). Typically, women have been asked in these studies to perform a breast examination on specially constructed breast models containing simulated tumors. Other research has had women perform breast examinations on themselves (Crosson et al., 1978). In both types of examinations, the behaviors used in executing the examination are recorded and evaluated against established behavioral criteria. Both of these studies found that most women do not perform BSE competently. They use one or more incorrect behaviors (e.g., incorrect motion, wrong hand parts used) in their examinations and have difficulty detecting tumors.[2] Eight to 28 percent of women are unable to detect any breast tumors at all (Alagna and Reddy, 1984; Howe, 1980). That poor technique was found where the majority (60 percent) reported practicing BSE monthly suggests that practice frequency alone is not a good indicator of performance and must be measured in conjunction with breast examination proficiency in order to accurately assess the efficacy of BSE in relation to breast cancer stage at

diagnosis.

A related area of research has examined the type of practice required to become proficient at BSE and the ability of women to detect small breast tumors using palpation (e.g., Adams et al., 1976; Stephenson et al., 1979; Hall, 1977). This research has shown that women given the opportunity to practice palpating for tumors in a breast model improve their ability to detect tumors, with more adequate technique producing the greatest improvement (Stephenson et al., 1979). This ability generalized to finding tumors in human breast tissue, did not decay over time, and was not significantly affected by breast volume or size.

Finally, some research has been directed toward identifying correlates of BSE performance. These investigations almost without exception have examined factors related to BSE frequency rather than to BSE proficiency. Moreover, most of this research has not been theoretical or conceptualized in a testable model.

Variables examined can be grouped into three basic categories -- predisposing, enabling, and reinforcing factors (Mammon, Zapka, Ciperson, and Docie, 1983). Predisposing factors include variables such as belief in BSE as an effective detection technique and perceived confidence that one can use BSE to detect breast abnormalities. These factors facilitate personal commitment to BSE. Enabling factors include the accessibility of information on BSE and

breast cancer, such as instruction on correct BSE technique. The third category relates to feedback and social influences which encourage or discourage BSE. For example, physician recommendations and partner support and encouragement for BSE represent reinforcing factors.

Demographics appear to bear no consistent relationship to BSE, although several studies have noted a positive correlation between BSE frequency and age, and BSE frequency and educational level (Howe, 1981; National Cancer Institute, 1980; Turnbull, 1978; Gallup, 1977; Stillman, 1977). Older age has also been associated with less frequent BSE practice (Celentano, and Holtzman, 1983).

Strong beliefs in breast cancer susceptibility and severity have also been found to correlate positively with BSE performance in some studies (Stillman, 1977; Kelly, 1979), but not others (Alagna and Reddy, 1984; Bevett, Alagna, Reddy, and Bagley, 1984). Similarly, mixed results have been found regarding the influence of encouragement and support on BSE practice (Reddy, Alagna, and Bevett, 1983; Howe, 1981; Trotta, 1980; Magarey, Todd, and Blizard, 1977). That support and encouragement for BSE has not been found to be consistently related to BSE practice may reflect more on the manner in which these variables have been measured than on the absence of any true relationship between them, since there is a difference between feeling that one's physician supports BSE and receiving actual support and encouragement to perform BSE (e.g., being reminded to perform BSE).

Fears of discovering breast cancer and fears of breast loss have been found to impede BSE in some studies, but not others (Alagna and Reddy, 1984, Turnbull, 1978, Stillman, 1977). Embarrassment and difficulty remembering to perform BSE also have been explored as barriers to BSE and found to be inconsistently associated (Howe, 1981; Grady, Kegeles, and Lund, 1980; Stillman, 1977; Green, 1976).

A national survey (Gallup, 1977) and numerous small studies have found confidence in BSE as an effective detection procedure and personal confidence about performing the technique to be important factors determining practice frequency and proficiency (Bevett et al., 1984; Alagna and Reddy, 1984; Ross, 1983). The importance of these variables is highlighted by the fact that they appear to be equally important among high and low risk women (i.e., women with or without strong familial histories of breast cancer).

While several studies have reported positive correlations between knowledge of BSE and performance frequency, others have not (Bevett et al., 1984; Howe, 1981; Trotta, 1980; Reeder, Berkanovic, and Marcus, 1980; Gallup, 1977). In one study, knowledge of correct BSE technique was unrelated to BSE frequency, but was found to be an important predictor of BSE proficiency (Alagna and Reddy, 1984). In this study, however, knowledge was not as important as self-confidence in predicting BSE proficiency scores. In

another study, self-confidence was found to be the only predictor of BSE frequency (Bevett et al., 1984). Proficiency was not examined.

In summary, a substantial number of studies have examined correlates of BSE frequency. Fewer have investigated correlates of BSE proficiency since it has only recently been recognized that frequent practice is not synonymous with competent performance, and behavioral studies are more difficult than survey studies to conduct. Only one consistent correlate of BSE proficiency and frequency has emerged, women's self-confidence about performing BSE. The importance of this variable is highlighted by the fact that it has been repeatedly found in numerous samples, including a national survey, to be a correlate of both how well and how often a woman performs BSE.

Research Needs

Contradictions in the literature may be due, in part, to the paucity of research examining objective measures of BSE. Proxy measures of performance have been relied upon extensively, including self-reports of the number of positions attempted and behaviors used in a typical examination (e.g., flat pads of fingers, supine position). This is a problem since a clear relationship between self-report and behavioral indices of BSE has not yet been established. Agreement between questionnaire indices of BSE proficiency and observed performance has been noted in some studies, although this agreement is not a strong one (e.g., Alagna and Reddy, 1984). It is likely

that questionnaire indices of BSE overestimate the quality of BSE usually practiced by women, especially when behavioral evaluation is not anticipated by respondents.

More valid indicators of BSE proficiency than self-report measures need to be examined. Proficiency criteria might include number, size, and depth of tumors identified in simulated breasts. In addition, technique proficiency as measured by behavioral objectives, e.g., using a consistent motion in examining each breast, could be evaluated more often. Ultimately, BSE performance needs to be examined in a large, representative sample since only then can data be obtained to document BSE's presumed benefits.

A second problem in this literature is that selection of variables for study has rarely been guided by theory and research. The reasons for this are unclear since there are several social psychological formulations of health behavior, such as the Health Belief Model (Rosenstock, 1974) and the health locus of control construct (Wallston, Wallston, and DeVellis, 1980) as well as health preference measures such as the Health Opinion Survey (Krantz, Baum and Wideman, 1980), that might help to explain why women do or do not perform BSE. Despite the potential usefulness of these psychosocial models in explaining BSE, only one study has developed and tested a conceptual model of BSE based of previous research and theory (Alagna and Reddy, 1984). In this study, women performed a breast examination on a model which contained

simulated tumors so that the researchers could document what behaviors women actually used and which if any of the hypothesized variables predicted proficiency in terms of quality of technique and number of tumors detected. The number of tumors detected by women was strongly correlated with the quality of their technique and regularity of their practice and the best technique was displayed by women high in self-efficacy regarding BSE (i.e., high in confidence that BSE has value and that they could use BSE to detect breast changes in their own breasts).

While these findings are promising, there are a number of shortcomings to this research and several issues remain to be resolved. First, the concept of self-confidence in the efficacy of BSE needs clarification. Specifically, an important distinction can be made between confidence that BSE is a valuable technique for early detection of breast abnormalities and <u>personal</u> confidence that one can use the technique successfully. While previous research has not discriminated these two components of self-confidence, it may prove useful to do so in order to examine their separate and/or joint effects on BSE proficiency and frequency. Examination of the single-item correlations in the one prior study attempting to differentiate these beliefs revealed that although both technique confidence and personal confidence about performing BSE correlated positively with proficiency, the correlations were higher for the two items measuring personal confidence than for the item measuring belief in BSE as an effective detec-

tion technique. Thus, these findings suggest that the strongest determinant of proficiency would be personal confidence about performing BSE. However, the validity of this suggestion needs to be examined.

Second, self-confidence in the efficacy of BSE was found to be an important determinant of BSE proficiency among white, highly educated women. While these demographics accurately reflect the typical breast cancer patient (i.e., white women are at higher risk for breast cancer, higher education is associated with delays in child bearing, which is a known breast cancer risk factor), it is unclear whether the same results would emerge in a racially heterogeneous, less educated sample. Examination of BSE proficiency in minority women is particularly important in view of the higher breast cancer mortality rate among black women as compared to white women. Also, very little research on BSE has sampled minority women.

Another interesting question concerns what influence benign breast symptoms have on BSE performance. Nearly 50 percent of women sometime during their adult lives experience benign breast symptoms. Most of these symptoms are an exaggeration of the changes that normally take place in the breasts with each menstrual cycle. In some women, the breast, unlike the uterus, is unable to shed promptly its preparation for pregnancy. Consequently, what starts out as an orderly process is carried too far to be reabsorbed when pregnancy does not take place, so each month excess

fluid is built up, causing breast thickening and lumpiness. Breast symptoms appear in a variety of forms depending upon whether the fibrous tissue, glands, or ducts are involved. Because of this variability, breast symptoms go by several different names, but are collectively referred to as "fibrocystic disease."

Since self-confidence in the efficacy of BSE was of critical importance in determining how proficiently asymptomatic women performed BSE, it is important to discover whether breast symptoms would influence confidence in BSE as a detection technique or personal confidence about performing BSE. One can speculate that when breast abnormalities are the "normal condition" of the breast, women may feel less confident that they can detect new abnormalities which may develop. Therefore, a history of benign breast symptoms may hinder the development of a proficient breast examination technique.

Preliminary data from prior research support this notion (Reddy, Alagna, and Bevett, 1983). In this study, symptomatic women rated themselves as less confident than asymptomatic women that "lumps" could be found using BSE and were somewhat less proficient in their breast examination technique. These results were based on a small group of symptomatic women (n=13). It is important to examine the validity of these findings in a larger sample of symptomatic women since women with fibrocystic disease are at higher risk for breast cancer and previous research has not adequately addressed this issue.

Finally, most studies examining BSE proficiency have had women demonstrate their level of proficiency on breast models, rather than on themselves. As noted, breast models are often selected because they contain known tumors that vary in detection difficulty. The tumors in models provide a standard, objective criterion to evaluate women's breast examination proficiency. For this reason, breast model examinations are often preferred to actual self-examination demonstrations.

While it is difficult to imagine that the type of examination anticipated and performed by women in research has an effect on women's responses or performance, especially since previous research has shown that proficiency trained on a model generalizes to detection of human tumors, no study to date has examined this possibility. Since the goal of all BSE training programs is for women to be proficient at BSE on themselves, the comparability of "self" examination and "model" examination needs to be explored.

The present study was designed to address several of these unresolved concerns and questions. First, since selection of variables for study in most previous investigations has not been guided by theory or conceptualized into a testable model, a model of BSE behavior was developed. A review of past research on BSE and several psychosocial models of health behavior guided the selection of variables that were included in this model. The proposed model

predicted that tumor detection would be primarily a function of behavioral skills (i.e., the proficiency of a woman's technique and the frequency of her previous practice) (see Figure 1). In turn, the model predicted that quality of technique would be most strongly correlated with (a) greater personal confidence about performing BSE, (b) stronger belief in BSE as an effective strategy for the early detection of breast abnormalities and (c) more accurate knowledge of correct BSE technique (see Figure 2).

As noted, the one previous study that examined the conceptual distinction between (a) believing that BSE has value and (b) being confident that one can use it successfully, was unsuccessful in differentiating these beliefs as evidenced by high intercorrelations. It was thought that this failure might be due to the limited number of items measuring them. To clarify the two confidence dimensions, additional measures were developed and used to tap these beliefs.

While the variables specified in the proposed model were expected to adequately explain breast examination proficiency, the expected direction of other potentially important variables was also specified (see Table 1). The first goal of this research was to test the explanatory power of these hypothesized constructs as a step toward developing more effective BSE training programs. To test these relationships, the variables presented in Figures 1 and 2 and Table 1 were measured in a racially mixed, educationally heterogeneous sample. Rather than relying on

women's self-reports of the behaviors they typically use in a BSE, breast examination proficiency was observed and evaluated against objective behavioral criteria. In doing so, needed descriptive information on BSE proficiency was obtained, breast examination performance among minority women was explored, and the issue of the generalizability of prior findings to black women and less educated women was addressed.

In addition, a small group of women performed breast examinations on themselves, while the remainder performed examinations on breast models. Thus, the responses and performances of these two groups could be compared. Finally, this study examined the question of what effect(s), if any, benign breast symptoms would have on personal confidence about performing BSE, belief in BSE as a detection procedure, and breast examination proficiency.

Study Aims and Hypotheses

To summarize, the major aims of this research are: (1) to test the explanatory power of a proposed model of BSE behavior in predicting breast examination proficiency (i.e., the quality of technique displayed by women and their ability to detect tumors in breast models); (2) to examine what effect benign breast symptomatology has on personal confidence about performing BSE, belief in BSE as a detection procedure, and breast examination proficiency; (3) to determine if the type of breast examination anticipated and performed by subjects in research has any effect

on their responses or breast examination technique; (4) to compare breast examination performance among black women and white women; (5) to examine the generalizability of the self-confidence finding in a racially heterogenous and less educated sample; and (6) to document the correct and incorrect behaviors used by women in performing a breast examination and their ability to detect breast tumors in models.

This study also seeks to examine the separate and/or joint effects of belief in BSE as a valuable technique for early breast cancer detection and personal confidence that one can use BSE successfully on breast examination proficiency. Specifically, it is hypothesized that:

(1) proficiency of technique (i.e., subjects' breast examination proficiency scores) and frequency of practice will predict tumor detection (see Figure 1);

(2) personal confidence about performing BSE, confidence in BSE as a procedure for the detection of early breast abnormalities, and knowledge of correct BSE technique will predict breast examination proficiency (see Figure 2);

(3) the proposed direction of relationships between other variables and breast examination technique proficiency, and tumor detection will be confirmed (see Table 1);

(4) women with benign breast symptoms will be less confident that they can use BSE successfully, will demonstrate poorer technique, and as a consequence will be less able to detect tumors in breast models;

(5) the type of breast examination anticipated and

performed in research will have no effect on subjects' responses or performance;

(6) personal confidence and technique confidence regarding BSE will be important predictors of breast examination proficiency;

(7) there will be no differences between black women and white women in their breast examination performance; and

(8) personal confidence about performing BSE will be more important than confidence in BSE as a detection technique in predicting breast examination proficiency.

The next chapter will describe in detail the methodology used in this study and the demographic characteristics of the women who participated.

Chapter Two - Methodology

METHOD

Subjects

Seventy-three women arriving for routine gynecological examinations and/or minor symptoms unrelated to the breast at the Ob-Gyn clinic of Kimbrough Army Hospital, Fort Meade, Maryland were asked to participate; all but seven agreed.[3] The sample was heterogeneous on all demographics measured (see Table 2). A majority (97%) rated themselves in "fair" to "excellent" health. The remainder rated their health as "poor" (1.5%) or were "unsure" (1.5%). Most subjects strongly or moderately felt that good health was important to them (66% and 32%, respectively). For the remainder (1.5%), health was a less salient issue.

Procedures

Subjects were invited to participate in this research according to their order of "signing in" at the clinic. On a typical day, every woman arriving at the study site was given the opportunity to participate. On days in which the volume of visitors was especially high, time constraints necessitated that every third woman be invited to participate. This procedure ensured that subjects could complete the study without interuption and could retain their priority for seeing the medical staff (see Appendix A). A prospective subject was given an informed consent document which described in detail her rights, the general aims of the study, what participation would entail, and what she could expect to gain from par-

ticipation (see Appendix B). It was emphasized that participation was voluntary and was not in any way connected with the use of hospital services. Anonymity and confidentiality were insured through the use of code numbers to identify all data collected. Further, it was emphasized that participation could be terminated at any time for any reason without penalty.

To ensure that only women arriving for routine gynecological examinations and/or symptoms unrelated to the breast participated, subjects were asked to disclose the reason(s) for their clinic visit.[4]

Subjects who met this criterion were asked to sign the informed consent form. Subjects were then presented with a questionnaire which requested demographic and health history information and contained the self-report measures described in Chapter Three. After completing the questionnaire (see Appendix C), subjects performed a breast examination. Twelve subjects were requested to demonstrate on themselves how they perform a typical BSE. The remainder demonstrated how they perform a typical BSE using silicone breast models. This variation in the type of breast examination performed was determined randomly prior to initial subject contact. Subjects knew prior to completing the questionnaire which type of breast examination they would be performing.

The breast models used were developed by the Spenco Medical Corporation and resembled in appearance, texture and weight human breasts. These models were mounted with

double-faced tape to a plexiglass stand designed to ensure uniform placement and accessibility to all contours of the models. Each model contained five simulated tumors, ranging in size from .26 cm. to 1.20 cm. These tumors varied in depth within the model.

Subjects performing breast examinations on models were seated directly behind the plexiglass stand which was positioned so that its back was near the subject's chest, duplicating the actual position of the breasts. Subjects were not informed that there were simulated tumors in the breast models. Subjects performing breast examinations on themselves also did so seated.

Each subject's breast examination performance was evaluated individually by two independent raters.[5] In order that the observers would not have their focus of attention disrupted, subjects were requested to hold comments or questions until their examinations were completed. The behaviors displayed by subjects in executing their breast examination were recorded using a behavioral checklist (see Appendix D).[6] Upon indicating that they had completed their breast examinations, breast model subjects were asked if they had noticed any "lumps" in either breast model and, if so, how many and where they were. Confirmation of tumor detection was made by having subjects take one of the observer's hands and place it on the tumor. This procedure was repeated for each tumor indicated and the number of tumors found was recorded. Completion of the

questionnaire and breast examination demonstration concluded the study. Following this, subjects were randomly assigned according to race to one of three interventions: (1) a psychological intervention designed to increase self-confidence in BSE, (2) an educational intervention designed to increase knowledge of breast cancer and correct BSE technique, and (3) a control intervention. Subjects assigned to the control intervention received procedural information on pelvic exams. Subjects assigned to the educational intervention received standard BSE procedural training and related information on breast cancer. Finally, psychological intervention subjects received BSE procedural training and related information on breast cancer in addition to information designed to increase confidence in BSE as an effective technique for the early detection of breast abnormalities, and personal confidence about performing BSE. Each intervention presentation was approximately 10 minutes, followed standardized scripts and used a one-to-one presentation format. At the conclusion of each presentation, subjects were asked to complete a short questionnaire, containing some of the same questions asked previously. Since the intervention study is not part of this dissertation it will not be discussed any further. Subjects were paid 10 dollars for their participation. The following chapter describes the development of the questionnaire and behavioral checklist and the rationale for selected measures.

Chapter Three

Development of the Questionnaire and Behavioral Checklist

A questionnaire with a fixed response format rather than interview was used to measure subjects' health history, current BSE practice, and attitudes toward BSE and breast cancer because it was judged to be easier to administer, less arousing, and more objective. Variables were included on the questionnaire if research or theory suggested that they might be important to BSE. For example, in addition to requesting demographic and health history information, the questionnaire contained several measures relating to experience with BSE. One relevant variable is knowledge of correct BSE technique. In addition, knowledge of breast cancer risk factors and knowledge of breast cancer symptoms were examined since they are also important and have not typically been measured together with knowledge of correct BSE technique in previous research.

To construct the measures for each knowledge variable, a list containing correct and incorrect BSE behaviors, risk factors or symptoms was generated. Items that were thought to be discriminators of good from poor knowledge were included. The subjects' task on these measures was to select the appropriate responses (i.e., the correct behaviors necessary to perform BSE, the valid risk factors for breast cancer, or true breast cancer symptoms). Aside from these three knowledge variables, other variables rele-

vant to current practice are, "whether a woman had ever heard of BSE," or if she had "ever performed a BSE." This latter variable is particularly interesting since findings indicate that many women have tried BSE once, but fail subsequently to continue to practice it. Both factors were measured in this study. A "yes," "no," or "maybe" response format was used. The "maybe" option was included to provide subjects who might be reluctant to admit to not ever hearing of or performing BSE with a face-saving response that would still reveal their lack of awareness or practice. The primary measure of practice frequency was how often subjects indicated that they had practiced BSE in the past six months. Although self-report measures of BSE frequency are thought to overestimate BSE practice, this particular measure was chosen because it does not direct subjects' attention to an obvious, desirable response. Rather, subjects were free to choose any practice rate between zero and seven or more times in the past six months. A woman indicating that she had performed BSE six times in the past six months would be considered to be a regular, monthly practicer. In contrast to this measure, the question, "Do you practice BSE regularly?" is highly directive, and also was included on the questionnaire for comparison purposes.

The final measure relating to experience with BSE pertained to instruction in BSE technique. Subjects indicated whether they had ever been taught BSE and, if so, when, by whom, and what this instruction entailed. Questions on the type of instruction received are particularly

important since it is crucial to know if any subjects had prior experience with the breast models used to evaluate breast examination proficiency in this study.

Health Belief Model Variables

Aside from current practice factors, a major portion of the questionnaire measured attitudes towards BSE and breast cancer. Many of the attitudinal variables examined were suggested by a theoretical formulation of health behavior called the Heath Belief Model (HBM; Rosenstock, 1974). The HBM suggests that health action is determined by perceptions of one's susceptibility to the illness and by perceptions of the severity of the disease, which together produce a readiness to take action. This readiness will result in the health behavior when there is an appropriate cue to action, a lack of significant barriers, and the individual believes in the efficacy of taking action (c.f., Becker and Maiman, 1975). Applied to BSE, this suggests that given an appropriate cue (e.g., exposure to media information on the importance and technique of BSE) and the lack of significant barriers (e.g., fear, embarrassment), the frequency of BSE practice should be enhanced by the recognition that one is susceptible to breast cancer, by the perception that the consequences of getting breast cancer are severe and by the belief that performing BSE is efficacious (i.e., a woman's confidence that she can use BSE to detect breast changes).

Grady, Kegeles and Lund (1980) developed several

measures specific to BSE examining the HBM beliefs described above. Some of their measures were adapted for use in this study. For each, subjects responded on seven point scales with endpoints labeled "not at all" and "very."

(a) perceived susceptibility to breast cancer. A subject indicated how likely she thought it was that she would get breast cancer at some time in her life.

(b) perceived severity of breast cancer. A subject was asked to rate how effective she thought available treatments for breast cancer were, and how good she thought her chances of surviving breast cancer were. These items correlated .51.

(c) self-confidence about performing BSE. A subject indicated how confident she was that she knew a correct BSE technique, that she could find small tumors using BSE, that she could "draw a mental picture" of what her breasts look and feel like during a self-examination, and that she could become familiar enough with her breasts to enable her to "draw mental pictures of them." These items correlated .79.

(d) perceived efficacy in BSE technique. A subject indicated how strongly she believed that tumors could be detected using BSE and how confident she was that BSE could be as effective as a breast examination performed by a physician. These items correlated .72.

(e) barriers to BSE performance. In addition to knowledge of correct BSE technique, confidence in clinical

breast examination, fear and embarrassment about performing BSE, and difficulty remembering to perform BSE were measured as possible impediments to BSE. A subject responded to the questions, "how embarrassing do you think BSE is, how frightening is it to perform BSE, how difficult do you feel remembering to perform BSE is, and how confident are you that small tumors and breast changes will be found by a physician during a breast examination?"

Health Preferences, Health Locus of Control, and Health Value

In addition to variables specified by the HBM, the questionnare contained two survey instruments: the Health Opinion Survey (HOS; Krantz, Baum, and Wideman, 1980) and the Multidimensional Health Locus of Control construct (MHLC; Wallston, Wallston, and DeVellis, 1978). The HOS measures two health preferences, desire for a more or less active role in health (behavioral involvement, e.g., "Except for serious illness, it's generally better to take care of your own health than to seek professional help") and desire for more or less information in health matters (informational involvement, e.g., "I'd rather have doctors and nurses make the decisions about what's best than for them to give me a whole lot of choices"). These preferences have not been examined in relation to BSE. However, research suggests that individuals who score higher on the HOS behavioral involvement subscale and the HOS informational involvement subscale are more likely to engage in preventive dental practices (c.f., Krantz et al., 1980).

Since the HOS might also relate to BSE performance, it was administered to subjects in this study. The standard response format was used.

The MHLC measures three expectational constructs, the belief that one's health is largely determined by one's own behavior (internal HLC, e.g., "I am directly responsible for my health"), the belief that one's health is determined by chance or fate (chance HLC, e.g., "When I stay healthy, I'm just plain lucky") and the belief that one's health is controlled by powerful others (powerful others HLC, e.g., "Health professionals keep me healthy"). Normative data indicate that persons who engage in preventive health behavior show relatively high health internality and low health chance beliefs (Wallston and Wallston, 1981). Applied to BSE, it would be anticipated that BSE proficiency would increase with higher internal HLC orientation and decrease with higher chance HLC. While powerful others HLC might also be important, the relationship could be either positive or negative. A positive relationship would be expected to the extent that women followed the instructions of a powerful other (e.g., physician, nurse) to perform BSE. However, a negative relationship might also occur if the care received from health professionals (e.g., clinical breast examination) is viewed as sufficient since there would be little rationale for performing BSE. Although recent findings suggest that the HOS is a better predictor of health action than the MHLC (Wallston and Wallston,

1981), and MHLC findings have been mixed, the MHLC was administered since the two external subscales were found to have some predictive value in prior work to this study (Alagna and Reddy, 1984).

The health locus of control construct is derived from Rotter's social learning theory (Rotter, 1966) which posits that expectations for reinforcement and the value of the reinforcer govern whether a behavior will occur or not. Consequently, it is important to measure the three MHLC orientations in conjunction with health value. A four item Likert-scale measure of health developed by K. A. Wallston was used in this study. This measure consists of four statements: (1)"Being healthy is really important to me;" (2)"My health is the thing that matters most to me;" (3) "I would rather have my health than anything I can think of;" and (4)"Good health is the number one priority in my life." For each, subjects responded on a six point scale with the endpoints labeled "strongly disagree" and "strongly agree." A numerical value was assigned to each of the six response points. A subject's health value score was simply the sum of the values assigned to the subject's response on each of the four statements.

Performance Measures

In addition to the self-report measures described, this study collected performance measures of subjects' breast examination proficiency. Breast examination proficiency was operationally defined in two ways: (1) the number of tumors detected in the breast models, and (2) the

number of correct behaviors performed in a breast examination demonstration. These measures are of central importance since they served as the principal dependent variables in the regression analyses to be described in the next chapter, and provided objective information on the quality of breast examination typically performed.

Both indices of proficiency were recorded using a specially constructed behavioral checklist (see Appendix D). Specific behaviors included on the checklist were selected after an analysis of currently used BSE instructional materials (e.g., American Cancer Society, National Cancer Institute, and Public Health Service pamphlets) and consultation with experienced medical personnel. For each breast, the behaviors recorded were: (a) whether the same side or opposite side arm was used; (b) whether one, two, three, or four fingers were used; (c) whether the fingers were together or apart; (d) whether one or two hands were used; (e) the specific part(s) of the hand(s) used (e.g., flat pads of fingers versus whole palm, tips of fingers and nails, etc.); (f) whether the breast was examined in a clockwise fashion, concentrically, or in quadrants versus in no systematic way; (g) type of motion used (e.g., circular massaging versus horizontal or vertical rubbing motion, pinching or plucking, etc.); (h) whether one breast was fully versus partially examined before moving to the second; (i) whether the same or different motion was used in examining each breast; and (j) whether the same or dif-

ferent starting point was used in examining each breast. The underlined behaviors were scored as correct. Incorrect behaviors and combined performance of correct and incorrect actions were not given credit. The overall proficiency of each subject's BSE technique was the unweighted sum of the number of correct behaviors demonstrated.

Behaviors recorded during the mirror inspection portion of the breast examination demonstration included: (a) whether the breast was inspected with arms at sides, with the arms raised above head and with the hands pushing on hips or palms pressed together contracting the chest muscles, and (b) whether the first two maneuvers were conducted while facing a mirror and sideways to a mirror. To compare this sample's breast examination proficiency scores with prior work and to standardize BSE research measures, these behaviors were excluded from the computation of subjects' proficiency scores.

Also recorded on the checklist were the total number of simulated tumors found by breast model subjects and the position of each detected tumor in the models. Subjects' tumor detection scores were simply the number of tumors found.

Chapter Four

RESULTS

Analyses proceeded along three lines, paralleling the major aims of this research. First, statistics were computed to describe the sample's breast examination proficiency and responses to the questionnaire. Second, chi square analyses and analyses of variance were performed to examine differences between blacks and whites, symptomatic subjects and asymptomatic subjects, and actual breast examination performers and model performers. Finally, multiple regression analyses were performed to test how well selected variables predicted breast examination proficiency following the model of BSE behavior summarized in Figures 1 and 2.

The first section in this chapter describes the sample's responses to the questionnaire and behavioral BSE test. Section two focuses on sample subgroups. Effects of race, breast symptom class, and breast examination type on BSE are reported. The concluding section presents the results of two stepwise regression analyses identifying predictors of (1) proficient breast examination technique, and (2) successful breast tumor detection.

Statistics were computed to describe subjects' responses to questionnaire items examining BSE awareness and frequency, BSE instruction, encouragement for BSE, use of mammography, thermography, and clinical breast examination, and knowledge of breast cancer and BSE.

BSE Awareness and Practice Frequency

Ninety-six percent of the subjects reported having been aware of BSE as a screening procedure for breast cancer and almost two-thirds reported having performed BSE at least once. While most subjects indicated that they had tried BSE, only 15 percent reported having performed it the recommended frequency (monthly). The median practice frequency was twice in the past six months, and 79 percent of the sample reported practicing it four or fewer times (see Figure 3). These rates are lower than those reported in recent survey studies (e.g., Stillman, 1979; Keller, 1978), but are comparable to investigations using objective measures of BSE performance such as behavioral observations rather than self-reports (e.g., Alagna and Reddy, 1984). The lower practice rates reported in this study may be due to the fact that the subjects knew they would be observed performing a breast examination. Consequently, they may have been more accurate in their estimates of practice and less reluctant to admit to not practicing BSE - a positive health behavior - than if no demonstration had been anticipated.

While 15 percent of subjects reported performing BSE the recommended frequency of six times in the past six months (monthly), over twice as many (36%) reported practicing BSE regularly when the question was phrased in more general terms (i.e.,"Do you practice BSE regularly?") (see Table 3). This discrepancy between the percentage of sub-

jects reporting regular practice and monthly practice suggests that subjects were unsure of what constitutes "regular" practice. Supporting this notion, 88 percent of subjects who reported planning their self-examinations for a particular time performed BSE on unorthodox dates (e.g., premenstrally).

BSE Instruction

Forty-four percent of subjects reported receiving personal instruction in BSE. Nurses (44%) and physicians (33%) were cited most frequently as sources of instruction, followed by female relatives and friends (23%). The median length of time since this instruction was two years. Personal demonstration of correct BSE technique was the most common instructional method reported (44%). Smaller percentages were shown how to perform BSE with a breast model (11%) or over their clothes (5%). Descriptions of the breast models used to instruct these subjects indicated that none were taught with the same models employed in this study. The remainder read pamphlets or saw instructional films on BSE.

Encouragement for BSE

Consistent with the fact that nurses and physicians most frequently provided initial BSE instruction, they also were reported most often as sources of encouragement for BSE (26% and 27%, respectively). Fourteen percent of the sample cited spouses and friends as sources of encouragement for BSE. Fewer subjects felt mass media information

on BSE (9%) or educational pamphlets (5%) were important.

Use of Mammography, Thermography, and Clinical Breast Examinations

Subjects did not rely on alternative procedures such as mammography or thermography for breast cancer detection. A majority indicated that they had never had a mammogram (86%) or a thermogram (93%) and over half (59%) were unaware that these are breast cancer detection procedures. Professional breast examinations were not widely sought by subjects. While a majority (82%) indicated that their breasts were examined during routine checkups, fewer than half (46%) specifically sought annual clinical breast examinations. Of those who did, 63 percent report at least biannual screenings.[8] The median frequency of reported visits to health professionals was once per year. Gynecologists (79%) were most often consulted for "female problems" by subjects, followed by family physicians (67%) and outpatient clinic staff members (24%).

Knowledge Factors

Three knowledge dimensions were examined separately: (1) knowledge of correct BSE technique, (2) knowledge of breast cancer risk factors, and (3) knowldege of breast cancer symptoms. For each, subjects were asked to select correct factors from a list containing correct and incorrect items. Responses to these scales revealed that the sample was not very knowledgeable of breast cancer and BSE.

With respect to knowledge of breast cancer risk factors, a majority incorrectly believed that larger breasted women were at greater risk (71%), that breast feeding increased susceptibility to breast cancer (88%), and that breast injuries increased risk of breast cancer (54%). Similarly, most subjects did not realize that x-ray exposure (60%) and reproductive history (early menarche, 80%; older first pregnancy, 80%; and never having children, 79%) were risk factors.

Subjects also scored low in their knowledge of breast cancer symptoms. A majority incorrectly felt that flat nipples (83%), breast nipple hairs (74%), and one breast being larger than the other (70%) were symptoms of breast cancer, although most subjects (83%) knew that a non-movable lump could be a potential sign of breast cancer. However, less than half of the sample knew that an orange peel appearance of the skin (30%), nipple discharge (46%), and breast discoloration (35%) could be signs of breast cancer. Subjects also had limited knowledge of correct BSE technique. For example, while a circular massaging motion was identified as a correct behavior by most subjects (82%), a high percentage of the sample incorrectly reported that an up-and-down rubbing motion (77%), and side-to-side rubbing motion (71%) also were essential to proper BSE. Similarly, while use of the flat pads of the fingers was correctly identified as a necessary step in BSE by most subjects (61%), roughly equivalent proportions of the sample also selected use of the whole palm (79%) and

fingertips (50%). Although a substantial number of subjects reported being taught BSE, the lack of knowledge of breast cancer risk factors and symptoms, and correct BSE is more severe than that observed in other recent studies (e.g., Alagna and Reddy, 1984). Demographic differences between this sample and previous research may explain this sample's poorer knowledge.

Health Belief Model Variables

The Health Belief Model (Rosenstock, 1974) suggests variables that might explain BSE performance. Variables proposed by this model include (1) a woman's recognition that she is susceptible to breast cancer, (2) her belief that the consequences of getting breast cancer are severe, (3) her confidence that BSE is a valuable technique in early breast cancer detection, (4) her personal confidence that she can perform BSE successfully, and (5) a lack of significant barriers to BSE such as fear, embarrassment, or a lack of knowledge about how to perform BSE. For each item measuring these beliefs, subjects responded on seven point scales. Scale points, six and seven indicated "strong" beliefs, while "moderate" beliefs were represented by scale points four and five, "slight" beliefs by three and two, and "no belief" by one. Percentages were computed to describe subjects' responses to measures examining these beliefs. Considerable response variability was found on most measures.

With respect to perceived susceptibility to breast

cancer, 55 percent rated themselves as having a moderate likelihood of getting breast cancer some time in their lives. This contrasts with 12 percent who felt very strongly that they will get breast cancer and 33 percent who felt their chances were slight or nonexistent.

For perceived severity of breast cancer, 37 percent of subjects reported that available treatments for breast cancer were very effective, 54 percent rated them as moderately effective, and 9 percent felt they were slightly or not at all effective.

Subjects were more optimistic in their perceptions of breast cancer survivability. Fifty-four percent thought that their chances of surviving breast cancer were good, while 41 percent felt their chances were fair. Only six percent believed they would not survive breast cancer.

With respect to perceived efficacy in BSE technique, 55 percent of subjects were very confident that BSE can be as effective as a breast examination by a physician, while 39 percent were moderately confident. Six percent were slightly or not at all confident that BSE is as valuable as clinical examinations in early breast cancer detection. Consistent with this, the majority of subjects felt very confident (53%) or moderately confident (38%) that detecting tumors while they are small through regular self-exams can lead to less involved treatments. This contrasts with nine percent of subjects who rated themselves as slightly or not at all confident on this variable. Similarly, most

subjects were very confident (53%) or moderately confident (35%) that BSE can increase a woman's chances of surviving breast cancer. The remainder (12%) felt slightly or not at all confident that regular self-exams can make a difference in breast cancer survivability.

For perceived self-confidence about performing BSE, 45 percent of the sample was skeptical that they could find small tumors or breast changes using BSE, while 30 percent felt moderately confident and 25 percent felt very confident. Consistent with this, 45 percent of the sample had little or no confidence that they knew a correct BSE technique. This contrasts with 25 percent of the sample who were very confident that they knew a correct technique for BSE. The remaining 18 percent rated themselves as moderately confident on this variable. Similarly, 46 percent of the sample had little or no confidence that they could "draw a mental picture" of what their breasts look and feel like during a self-exam, while 33 percent were moderately confident, and 21 percent felt very confident. A slightly greater percentage of subjects (25%) thought that they could become familiar enough with their breasts to enable them to "draw mental pictures of them." Thirty-nine percent rated themselves as not at all confident in this regard. The remainder fell in between.

Aside from not knowing how to perform BSE, confidence in physician breast examinations, difficulty remembering to practice BSE, and embarrassment and fear about performing BSE were examined as potential barriers to BSE.

Percentages computed to describe subjects' responses revealed that 43 percent felt very confident that small breast changes could be found by a physician, while 19 percent were not at all confident. Fifty-five percent did not feel BSE was difficult to remember to perform, although 17 percent thought it was very difficult. Similarly, 82 percent and 73 percent said that they had no embarrassment or fear about performing BSE respectively, while 5 percent felt it was embarrassing and 11 percent found it very frightening. The remaining percentages of subjects' responses on each potential barrier fell between these extremes.

Health Preferences and Health Locus of Control

The two survey instruments included were the Health Opinion Survey (HOS; Krantz, Baum and Wideman, 1980) and the Multidimensional Health Locus of Control construct (Wallston, Wallston, and DeVellis, 1978). The HOS measures two health preferences, desire for a more or less active role in health (behavioral involvement) and desire for more or less information about health matters (informational involvement). Means and standard deviations computed for these two health preference subscales are presented in Table 4.

The MHLC measures three expectational constructs, the belief that one's health is largely determined by one's own behavior (internal HLC), the belief that one's health is determined by chance or fate (chance HLC), and the

belief that one's health is controlled by powerful others such as physicians (powerful others HLC). Means and standard deviations computed for the HLC subscales are presented in Table 4. While statistics for the internal HLC and powerful others HLC subscales resemble normative data for healthy adults, the mean for the chance HLC subscale was somewhat lower than the norm for healthy adults (cf., Wallston and Wallston, 1981).

Breast Examination Proficiency

One aim of this study was to provide information on the proficiency of subjects' breast examination performances in terms of the ability to detect breast tumors and the quality of their technique. To accomplish this, subjects performed a breast examination after completing the questionnaire outlined in Chapter three. Both correct and incorrect behaviors displayed by subjects in their breast examination were recorded by raters using the behavioral checklist. The number of simulated breast tumors found by subjects performing breast examinations on models was also recorded.[9]

Percentages computed to describe subjects' breast examination proficiency are presented here. Findings indicated that subjects were poor breast examination performers. In terms of quality of technique, over half of the sample was inconsistent, using different motions (53 percent) and starting points (67 percent) when examining each breast. Similarly, a majority were unsystematic, examining

one breast partially before moving to the second (75 percent). A majority also displayed one or more incorrect behaviors. The most common incorrect behaviors displayed were in terms of hand part(s) and motion(s). Most subjects (56 percent) incorrectly used a patting, pinching/plucking, rubbing or some combination of these motions rather than a massaging motion, or used their palm and/or fingertips (59 percent) instead of their finger pads. A majority of subjects did, however, correctly hold their fingers together (69 percent) rather than apart, used two or three fingers (63 percent) in conducting their examination instead of one or four and searched with one hand rather than simultaneously examining the breast models or themselves with both hands (63 percent).

It is hardly surprising that subjects who displayed incorrect behaviors in their breast examination demonstration had difficulty detecting tumors. Twenty-three percent of breast model subjects found more than half (five or more) of the tumors in the models. The median number of tumors detected was 1.75. No subject found all ten tumors and 17 (33 percent) could not find any (see Figure 4).

Section Two

Effects of Race, Breast Symptom Class and Breast Examination Type on BSE

In Section Two, the focus shifts from a description of the sample's breast examination proficiency and ques-

tionnaire responses to an examination of the same topics in subgroups of the sample. Specifically, chi square analyses and analyses of variance were performed to investigate the effects of (a) race, (b) breast symptom class, and (c) breast examination type on reported practice and knowledge of BSE, attitudinal factors surrounding breast cancer and BSE, and observed breast examination proficiency. These issues are addressed separately, starting with race.

Race

Practice and Knowledge of BSE

There were no differences between whites and blacks in their practice of BSE. Variables examined included BSE awareness, frequency of BSE practice, BSE instruction, encouragement for BSE, and use of mammography, thermography and clinical breast examination. Black subjects and white subjects did, however, differ in their knowledge of BSE and breast cancer. Three knowledge scores, knowledge of correct BSE technique, knowledge of breast cancer risk factors, and knowledge of breast cancer symptoms, were computed for each subject. Analyses of variance on these three knowledge scores by racial subgroup revealed that black subjects scored significantly lower than white subjects on all three knowledge dimensions (see Table 5). These differences in knowledge of BSE and breast cancer cannot be explained by differences in educational levels or demographic and health history since black subjects and white subjects were similar in these respects.

Health Belief Model Variables

Racial differences were investigated for variables suggested by the Health Belief Model. Analyses of variance revealed that whites and blacks were similar in their beliefs about breast cancer and BSE with two minor exceptions. White subjects were more confident than black subjects that small breast changes could be found by a physician ($\bar{X}$ = 5.33 whites, $\bar{X}$ = 4.21 blacks; $F(1,55) = 5.23$, $p < .03$). However, blacks were more confident than whites that detecting tumors while they are small, though regular self-exams can increase a woman's chances of surviving breast cancer, ($\bar{X}$ = 5.04 whites, $\bar{X}$ = 6.21 blacks; $F(1, 55) = 5.79$, $p < .02$).

Health Value, Health Preferences, Health Locus of Control and Breast Examination Proficiency

No significant differences were found between black subjects and white subjects in the extent to which they valued health, their preferences for more or less informational or behavioral involvement in health, the quality of their breast examination technique, and the number of simulated tumors found. The only racial difference found was for powerful others HLC, $\bar{X}$ = 21.83 whites, $\bar{X}$ = 18.74 blacks, $F(1, 55) = 4.14$, $p < .05$. That white subjects held stronger beliefs that their health is under the control of powerful others (e.g., health professionals) is consistent with their greater confidence that small breast changes can

be found by a physician.

Breast Symptom Class

A major goal of this research was to examine the effect(s) of benign breast symptomatology on BSE. Subjects were designated as symptomatic if they reported a history of benign breast cysts, tumors, or fibrocystic disease. Subjects were considered to be asymptomatic if they did not report such problems. Twenty-six symptomatic and forty asymptomatic subjects were identified. Chi square analyses and analyses of variance were performed to examine differences between the groups. Symptomatic subjects did not differ from asymptomatic subjects in self-ratings of health. However, they did differ in age and educational level, with the symptomatic group being older ($X=33$ versus $X=27$ years of age, $F(1, 60)= 7.00$, $p<.01$) and more highly educated ($X=14$ versus $X=13$ years of education; $F(1, 60) = 6.08$, $p<.02$). No other demographic differences were found.

Knowledge and Current Practice of BSE

Analyses performed on knowledge scores by breast symptom class revealed that symptomatic subjects were more knowledgeable than asymptomatic subjects of correct BSE technique, $F(1,55)=9.29$, $p=.003$; $X=12.41$ asymptomatic, $X=14.63$ symptomatic. That symptomatic subjects possessed greater knowledge of BSE is hardly surprising since more symptomatic (96%) than asymptomatic (63%) subjects were taught BSE, and the mean length of time since this instruction was shorter for symptomatic subjects, $F(1,60)=7.59$,

$p<.06$; X=2.15 years-- symptomatic, X=4.32 years -- asymptomatic. While the two groups identified similar sources of BSE instruction (physicians, nurses), more symptomatic (86%) than asymptomatic subjects (14%) were shown how to perform BSE with a breast model, $X^2=5.03$, df=1, $p<.03$.

Current practice of BSE also differentiated asymptomatic subjects from symptomatic subjects. A significantly greater proportion of symptomatic (96%) than asymptomatic (47%) subjects reported that they had tried BSE, $X^2 = 16.58$, df = 2, $p<.001$) and performed it "regularly", $X^2 = 9.52$, df = 2, $p<.009$). Consistent with this, the mean frequency of BSE reported in the past six months was higher for symptomatic than asymptomatic subjects, X=3.20 symptomatic, X=1.69 asymptomatic; $F(1, 55)=6.81$, $p<.01$).

Health Value, Health Locus of Control and Health Preferences

No differences were found between symptomatic and asymptomatic subjects in the extent to which they valued health, their locus of control for health, or in their preferences for informational involvement in health. Differences were found on the HOS behavioral involvement subscale with symptomatic subjects scoring significantly higher than asymptomatic subjects. This indicates a stronger preference among symptomatic subjects for a more active role in their health, X=5.19 symptomatic, X=3.40 asymptomatic, $F(1,60)= 9.25$, $p<.003$.

Health Belief Model and Breast Examination Proficiency

Breast symptom class differences were examined for variables suggested by the Health Belief Model. With one exception, no differences were found. Symptomatic subjects were more pessimistic than asymptomatic subjects about surviving breast cancer, $F(1,55)=5.04$, $p<.03$. That few psychological measures discriminated asymptomatic from symptomatic subjects is consistent with the fact that they did not differ in their breast examination technique proficiency and tumor detection scores.

Race by Breast Symptom Class Interactions

Although interactions were not anticipated between race and breast symptom class, two-way analyses of variance were performed to examine possible interaction effects. A significant interaction was found between subjects' race and breast symptom class for ratings of how effective they thought available treatments for breast cancer were, $F(1, 59)=4.99$, $p<.03$. White asymptomatic subjects ($X=5.03$) and black symptomatic subjects ($X=5.03$) thought available treatments for breast cancer were effective, while white symptomatic subjects ($X=4.79$) and black asymptomatic subjects ($X=4.75$) were less optimistic about their effectiveness. No significant main effects were found for race and breast symptom class on this measure.

A second significant interaction was found between subjects' race and breast symptom class on knowledge of breast cancer risk factors, $F(1, 57)=5.34$, $p<.02$. White

symptomatic subjects (X=15.62) were more knowledgeable than white asymptomatic subjects (X=14.74) on this dimension, while the opposite held true for black subjects (X=12.18 symptomatic, X=14.28 asymptomatic). A significant main effect was found for race, $F(1, 57)=6.69, p<.01$, but not breast symptom class.

Breast Examination Type

To explore whether the type of breast examination anticipated and performed (i.e., actual self-examination or model examination) has any effect(s) on subjects' questionnaire responses or breast examination technique proficiency, twelve subjects were randomly chosen to perform breast examinations on themselves rather than on breast models. Chi square analyses and analyses of variance were performed to compare the two groups. No differences were found on any measure and no interaction effects between breast examination type and race or breast symptom class were noted.

Section Three -- Predictors

Following the model of BSE behavior summarized in Figures 1 and 2, stepwise regression analyses were performed to test how well selected variables predicted breast examination proficiency. In addition to the variables specified in this model, the variables listed on Table 1 were entered as independent variables in the regression analyses since research suggests that these factors might also be important to BSE performance.

In the first analysis, the dependent measure was breast model subjects' tumor detection scores (i.e., the total number of tumors found). Three variables contributed significantly to explaining tumor detection ($F(3,46) = 26.65$, $p < .001$). The coefficient of determination was $R^2 = .63$. Tumor detection was most strongly correlated with proficiency of breast examination technique. This factor accounted for 48 percent of the variance. Preferences for behavioral involvement in health (i.e., HOS Behavioral Involvement scores) and frequency of reported BSE also contributed significantly to the explained variance (see Table 6). All three factors related positively to detection.[10] Table 7 presents zero order correlations between tumor detection and the variables that did not contribute significantly to explaining tumor detection. The valence of each correlation was in the proposed direction, with two exceptions: confidence that breast problems would be found by a physician related positively to tumor detection, while perceived susceptibility to breast cancer related negatively. Both factors were weakly correlated with tumor detection.

Variables correlated with proficient breast examination technique were then examined. In this second analysis the dependent measure was subjects' technique proficiency scores. The independent varibles were the same as those in the tumor detection analysis with the deletion of technique proficiency scores. One variable, personal con-

fidence about performing BSE, accounted for 23 percent of the variance in proficiency scores ($F(1,59) = 17.83$, $p < .001$; see Table 8). Personal confidence about performing BSE was positively related to breast examination proficiency.[11] Table 9 presents zero order correlations between technique proficiency scores and the variables that did not contribute significantly to explaining technique proficiency. The valence of each correlation was in the predicted direction, with three exceptions: perceived susceptibility to breast cancer related negatively to technique proficiency scores, while embarrassment about performing BSE and difficulty remembering to perform BSE related positively. All three factors were weakly correlated with proficiency scores.

Chapter Five

DISCUSSION

This research was concerned with several aspects of BSE that have not or have seldom been examined. First, this study was designed to test a model of BSE behavior based on theory and past researh. In the course of testing this model, predictors of proficient breast examination technique and successful tumor detection were identified in a less educated and more racially heterogenous sample than those typically examined in past research. Second, this study investigated three important questions for which there is little information: (1) What influence, if any, does race have on knowledge and current practice of BSE, attitudinal factors surrounding breast cancer and BSE, breast examination technique proficiency, and tumor detection ability?; (2) What influence, if any, does breast symptomatology have on knowledge and current practice of BSE, attitudinal factors surrounding breast cancer and BSE, breast examination technique proficiency and tumor detection ability?, and (3) What influence, if any, does breast examination type have on subjects' questionnaire responses and breast examination technique proficiency? Finally, this study augmented the limited data base which now exists investigating breast examination proficiency. This information is important in resolving the conflicting findings of clinical investigations relating BSE to breast cancer stage at diagnosis (cf. Feldman, Carter, Nicastri, and Hosat,

1981; Senie, Rosen, Lesser, and Kenna, 1981; Smith, Francis, and Polissar, 1980).

The model of BSE proposed in this research predicted that tumor detection would be a function of behavioral skills (i.e., proficient technique and frequent practice), while proficient breast examination technique would be determined by psychosocial variables, most importantly personal confidence about performing BSE, belief in BSE as a valuable technique in early breast cancer detection, and knowledge of correct BSE technique. The results supported this model in several respects (see Figures 7 and 8). As hypothesized, breast examination technique proficiency and frequency of BSE were both significant, positive predictors of tumor detection. Also as predicted, personal confidence about performing BSE was of primary importance in breast examination proficiency. These results support and extend findings in past work (Alagna and Reddy, 1984).

Since personal confidence about performing BSE was the only significant predictor of breast examination technique proficiency, it merits special consideration. As noted, separate causal effects were hypothesized for personal confidence about performing BSE and for belief in BSE as an effective detection technique. These predictions were based on research that suggested their importance to BSE (Howe, 1980; 1981; Ross, 1983; Alagna and Reddy, 1984) and by reasoning that there is a conceptual distinction between believing that a technique has value and being confident that one can use the technique successfully. Personal con-

fidence about performing BSE was found to be more important than belief in BSE as a detection procedure in predicting breast examination technique proficiency. That their relative importance to proficiency was clarified is an important step toward building a valid model of BSE behavior. Personal confidence about performing BSE also was strongly correlated with frequent practice (r=.68). In fact, it had the largest zero order correlation with practice frequency of any variable measured. This underscores the importance of personal confidence in BSE in relation to how <u>often</u> and how <u>proficiently</u> a woman performs BSE. Moreover, it is noteworthy that while personal confidence about performing BSE was an important determinant of technique proficiency among both black women and white women, it was more strongly related to how well black women performed BSE. This finding suggests that black women may especially benefit from more psychologically oriented interventions designed to increase personal confidence in BSE.

In addition to confirming and extending past findings, the validity of several relationships observed in this study appear common sense. For instance, it is hardly surprising that the ability to detect tumors is related to the quality of breast examination technique and the regularity of its practice. However, this information is not insignificant since it documents the importance of doing BSE properly. That BSE is a simple procedure makes it preferable to other breast cancer screening techniques only

if there is accumulated evidence that routine, competent performance increases a woman's ability to detect breast abnormalities.

Consistent with past research, perceptions of susceptibility to and severity of breast cancer and the barriers of fear, embarrassment and confidence in clinical breast examination did not predict proficiency (Alagna and Reddy, 1984). Also unrelated to proficiency was the belief that BSE was difficult to remember to perform. This was true even though these factors were not highly intercorrelated and, with the exception of embarrassment and fear, there was considerable variability in subjects' responses on these measures.

One puzzling finding was that knowledge of correct BSE technique was not a significant predictor of proficient breast examination technique. The lack of relationship between proficient technique and adequate knowledge of technique was not due to a strong intercorrelation with personal confidence about performing BSE (r=+.27) or to a lack of variability in knowledge scores. A second unanticipated finding was the relationship between HOS behavioral involvement scores and tumor detection. This variable explained 12 percent of the variance in tumor detection scores, among white women. The more strongly white women preferred more active roles in their health, the more tumors they found during their examinations of the breast models. Preferences for behavioral involvement in health also correlated strongly with frequency of BSE (r=.53), and

personal confidence about performing BSE (r=.54). These findings suggest that white women who prefer greater responsibility in health matters may be more likely to adopt self-care behaviors such as BSE and benefit from these actions.

While certain variables in the proposed model of BSE behavior were empirically supported, the causal direction of some relationships may be challenged. One example is the causal relationship between personal confidence about performing BSE and breast examination technique proficiency. Although it was predicted that personal confidence in BSE leads to proficient performance, a bidirectional relationship seems equally plausible. Specifically, it makes sense that the more confident a women is that she can detect breast changes by correctly performing BSE, the more she should be willing to practice it, resulting in a better developed technique. However, it makes just as much sense that being able to perform BSE proficiently could increase a woman's confidence in her BSE ability. Evaluating the relative importance of these causal paths would seem a useful direction for future research.

Aside from testing a model of BSE behavior, this study examined the effect(s) of race, breast symptom class, and breast examination type on BSE. Of these variables, only breast symptom class affected practice frequency. Symptomatic women reported performing BSE more frequently than asymptomatic women. This finding is inconsistent with

past research in which no differences were noted in practice frequency between symptomatic women and asymptomatic women (Reddy et al., 1983). However, the mean frequency of practice found for symptomatic women in past research was higher than that of asymptomatic women which is in line with the higher rate of BSE reported by symptomatic women in this study.

Contrary to expectations, symptomatic women did not differ from asymptomatic women in their perceived confidence in BSE. Consistent with this finding, they did not differ from asymptomatic women in the proficiency of their breast examination technique or ability to detect breast tumors. In past research, symptomatic women scored lower in self-efficacy regarding BSE, demonstrated poorer technique, and were less able to detect tumors in models. While the basis for these discrepancies between present and past findings remains unclear, the present findings are based on a considerably larger, more heterogeneous sample. Therefore, they may be better estimates of practice in symptomatic women, although this is an empirical question that can only be addressed in a large, representative sample.

Finally, it is not surprising that symptomatic women were more knowledgeable of BSE and breast cancer. A greater percentage of symptomatic than asymptomatic women reported receiving instruction in BSE. The length of time since this instruction was shorter and this instruction more often included practice on breast models.

Not as explainable are the racial differences in knowledge of breast cancer and BSE. Black women scored significantly lower than white women in knowledge of correct BSE technique, knowledge of breast cancer risk factors, and knowledge of breast cancer symptoms. Aside from these consistent and highly significant findings, there were few differences between white women and black women. Consequently, an explanation for the differences in knowledge is lacking.

Finally, it is noteworthy that subjects' responses to the questionnaire and the BSE proficiency test did not vary as a function of anticipating and performing actual self-examinations versus breast model examinations. That the type of breast examination performed has no impact on subjects' performance is heartening since breast model examinations are preferable in research to actual self-examinations.

The third aim of this study was to provide information on BSE proficiency. A majority of women in this study displayed incorrect behaviors in their breast examinations and had difficulty detecting tumors. In light of the demographic heterogeneity of this sample, similar deficits are expected for women in the general population, although ultimately this is an empirical question. Although this study was not directly focused on the effects of training in BSE, the fact that a majority of women did not follow all the recommended steps for BSE, but still found one or

more tumors raises several questions concerning what type and degree of training, and quality of technique is essential to adequately perform BSE. In this regard, Hall, Goldstein and Stein (1977) and Grady, Kegeles, and Lund (1980) have pointed out that until very recently little attention was paid on documenting what specific behaviors or degree of training are necessary to teach women to perform BSE properly. Howe (1980) found that women who used the flat pads of their fingers in a firm, massaging motion regardless of other differences in technique were the most successful at detecting tumors. Corroborating and extending this finding, Alagna and Reddy (1984) noted that the hand part(s) used, type of motion, and thoroughness of the exam were the critical behaviors in determining whether tumors were detected or not. Consistent with this, women who were best at detecting tumors in this study used their finger pads in a circular, massaging motion and covered the entire breast.

The poor performance observed in this study highlights the need to alter educational and instructional BSE programs, particularly since many women reported receiving some instruction in BSE, but still were unsure of what constitutes regular practice and an adequate self-examination. The relationship between personal confidence about performing BSE and proficient technique suggests that instruction in BSE can be improved by including strategies to increase a woman's confidence that she can be proficient at BSE.

In summary, the findings in this study suggest some directions for future research, provide support for and clarify certain relationships observed in previous BSE studies, and resolve several research concerns. A promising next step would be to design and evaluate BSE interventions based on the relationship observed in this study and other studies between personal confidence about performing BSE and breast examination proficiency. Also, more investigations which include performance measures of BSE proficiency are needed. Studies using objective measures of BSE proficiency such as technique quality as measured by behavioral objectives or the number, size and depth of tumors detected in breast models will be important in resolving the conflicting findings of clinical investigations relating BSE to breast cancer stage at diagnosis (cf., Feldman et al., 1981; Senie, Rosen, Lesser, and Kline, 1981; Smith, Francis, and Pollissar, 1980). As more research which includes performance measures is conducted, practicing BSE proficiently on a monthly basis may prove to be even more valuable than currently anticipated.

FOOTNOTES

1
A randomized trial is currently being conducted in Great Britain.

2
Granted, even though it may be harder to find tumors in breast models because models only approximate the texture and firmness of natural breast tissue, are less familiar than one's own breasts and do not provide proprioceptive feedback as one's own breasts do, a major contributor to difficulties in detecting tumors on models is simply not knowing how to perform a thorough, competent examination.

3
The refuser group was racially mixed and appeared to be heterogeneous in age. Most (n=4) appeared to be in their mid-thirties. Two appeared to be about twenty to twenty-five years old. The remaining refuser was considerably older, appearing to be in her sixties. Most refusers (n=5) declined to participate because of time constraints. The other two refusers failed to give a reason for their non-participation.

4
All subjects who were invited to participate met the criterion of arriving at the clinic for routine pelvic examinations or minor gynecological symptoms.

5
The author and several female assistants conducted the behavioral observations. One observer served as a rater for all subjects, while a second observer rated 93 percent of the cases. The other observers served as second rater when needed.

6
All raters were thoroughly familiar with appropriate BSE technique and with the breast models and the behavioral checklist used to assess performance. Further, all raters were trained in the observation of BSE prior to the study. The interrater reliability for the performance ratings (using the behavioral checklist) was .90.

7
First, a hierarchical multiple regression procedure was performed. Variables in the proposed model of BSE behavior, summarized in Figures 1 and 2, were entered into the regression equations in the first block. The variables presented in Table 1 were then entered into the regression equation in the second block (stepwise). To check the validity of the findings, a stepwise multiple regression analysis procedure was then performed. Identical predictors were found using both procedures.

8
Two variables distinguished subjects who sought annual or more frequent self-initiated clinical breast examinations from those who did not: (1) frequency of BSE, ($t=3.20$, $p=.002$), and (2) personal confidence about performing BSE, ($t=2.81$, $p=.007$). Both factors related positively to clinical breast examination.

9
In addition, the position of tumors detected by breast model subjects was recorded. After the completion of the study, the tumors were labeled according to their depth in the models, and measured using calipers to determine their

size. In general, smaller tumors and deeper tumors are more difficult to detect. Since size of tumor was confounded with depth in the models (i.e., some of the smallest tumors were superficial), these data could not be used to draw meaningful conclusions about subjects' proficiency.

10 Technique proficiency was the only factor that contributed significantly to explaining tumor detection among black subjects, accounting for 63 percent of the variance. For white subjects, frequency of BSE practice followed by technique proficiency and preferences for behavioral involvement in health were important, respectively accounting for 56 percent, 12 percent, and 5 percent of the variance in tumor detection scores.

11 Personal confidence about performing BSE explained a greater percentage of the variance in proficiency scores for black subjects (39%) than for white subjects (21%).

Table 1

Expected direction of other potentially important variables

+	Perceived severity of breast cancer
+	Knowledge of correct technique
+	Perceived susceptibility to breast cancer
+	Embarrassment about performing BSE
-	Fear about performing BSE
-	Confidence breast problems will be found by M.D.
+	Difficulty remembering to perform BSE
+	Health value
-	Chance health locus of control
+	Internal health locus of control
-	Powerful others health locus of control
+	Preferences for informational involvement in health

Table 2

Sample demographics

Age	X=30 years, s.d.=11; range=17-66 years
Education	X=13 years, s.d.=2; range=9-18 years

Marital Status	
married	66%
single	29%
separated/divorced	5%

Religion	
Protestant	44%
Catholic	18%
Other or none	38%

Race	
white	54%
black	46%

Military Status	
active duty	44%
military dependent	30%
civilian	26%

Occupation	
professional	11%
white collar	18%
blue collar	39%
student/homemaker	32%

Table 3

Percentage of subjects reporting 'regular' BSE practice as a function of question wording

Do BSE Regularly?	Yes	n=22	36.1
	Maybe	n=5	8.2
	No	n=34	55.7
How often BSE Practiced in Past Six Months?	Six Times	n=10	15.2
	Other	n=56	84.8

Five subjects failed to complete the question, "Do you practice BSE regularly?"

Table 4

Health preference and health locus of control descriptive statistics

Health Locus of Control (HLC)

HLC Subscale	Mean	Standard Deviation
Internal	25.51	5.04
Chance	16.31	4.92
Powerful Others	20.32	5.96

Health Preferences (HOS)

HOS Subscale	Mean	Standard Deviation
Behavioral Involvement	4.10	2.49
Informational Involvement	4.60	1.97

Table 5

Knowledge scores by racial subgroup

Breast cancer risk factors

F(1, 55)=5.77, p=.020 X=15.09 white X=13.43 black

Breast cancer symptoms

F(1, 55)=33.35, p=.001 X=9.31 white X=5.77 black

Correct technique

F(1, 55)=8.74, p=.005 X=14.28 white X=12.17 black

Table 6

Regression Analysis for Lesion Detection

		Mult R	R^2	F Change	Sig	Correlation
Total Lesions Found	Proficiency of Technique	.69	.48	43.48	.000	+.69
	Preferences for Behavioral Involvement (BHOS)	.77	.60	14.53	.000	+.50
	Frequency of Performing BSE	.80	.63	4.49	.040	+.57

Table 7

Zero order correlations between tumor detection and other variables that did not load into the regression equation

+.06	Perceived severity of breast cancer
+.22	Knowledge of correct technique
-.10	Perceived susceptibility to breast cancer
-.04	Embarrassment about performing BSE
-.12	Fear about performing BSE
+.06	Confidence breast problems will be found by M.D.
-.06	Difficulty remembering to perform BSE
+.09	Health value
-.35	Chance Health Locus of Control
+.11	Internal Health Locus of Control
-.14	Powerful Others Health Locus of Control
+.39	Preferences for informational involvement in health

Table 8

Regression analysis for technique proficiency

	R^2	Sig	Correlation
Personal Confidence about performing BSE	.23	.001	+.48

Table 9

Zero order correlations between technique proficiency and other variables that did not load into the regression equation

+.01	Perceived severity of breast cancer
+.31	Knowledge of correct technique
-.17	Perceived susceptibility to breast cancer
+.08	Embarrassment about performing BSE
-.27	Fear about performing BSE
-.20	Confidence breast problems will be found by M.D.
+.01	Difficulty remembering to perform BSE
+.02	Health value
-.35	Chance health locus of control
+.12	Internal health locus of control
-.23	Powerful others health locus of control
+.37	Preferences for informational involvement in health
+.44	Frequency of BSE practice
+.35	Technique confidence

Figure 1

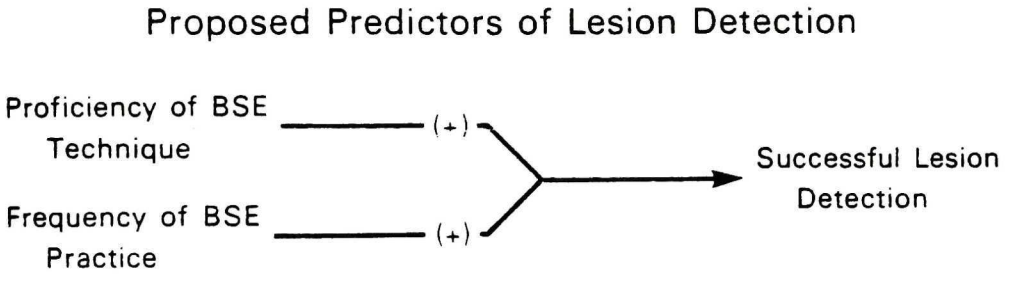
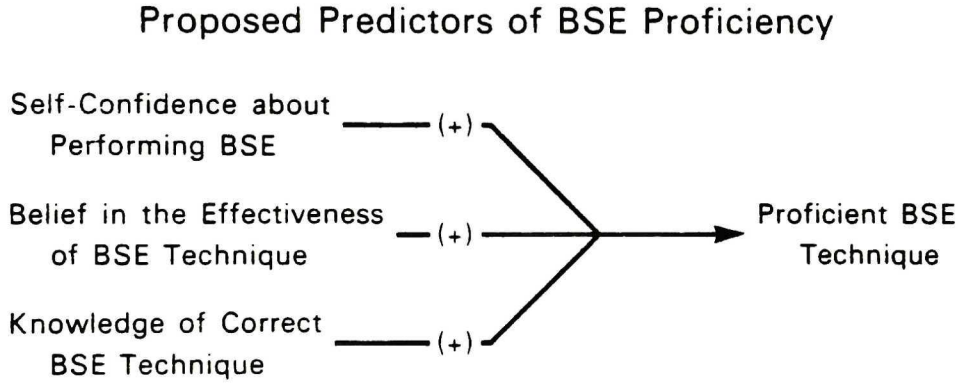
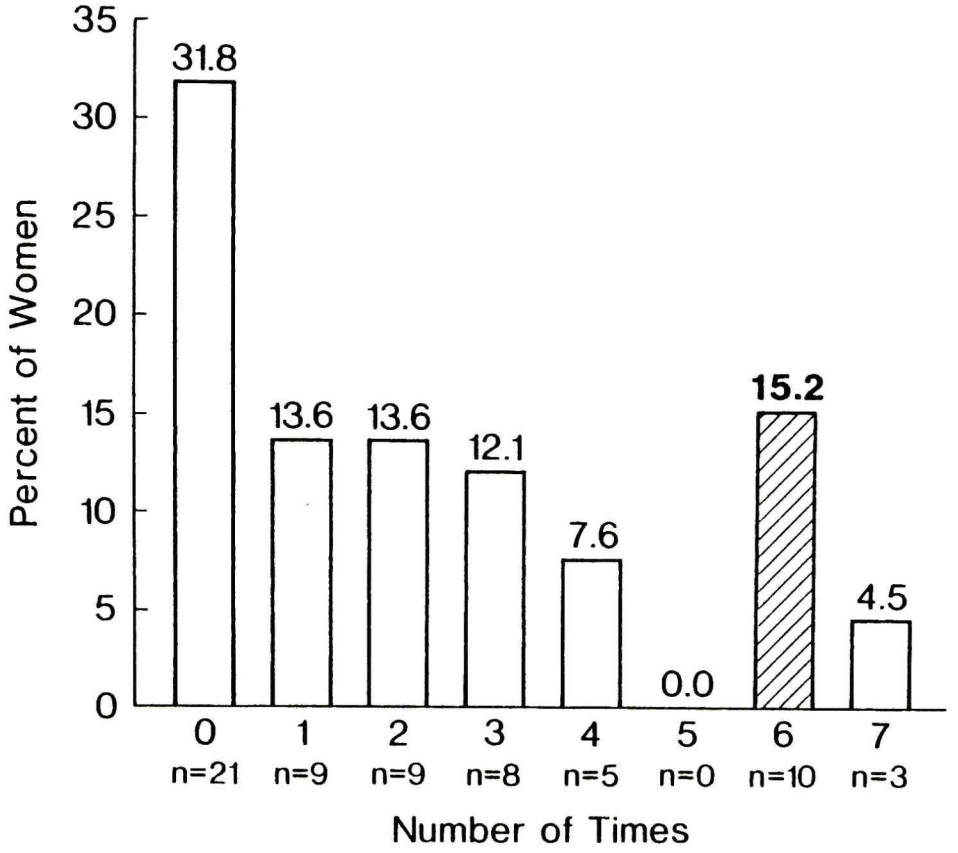

Proposed Predictors of Lesion Detection
Proficiency of BSE Technique
Frequency of BSE Practice
(+)
(+)
Successful Lesion Detection

Figure 2

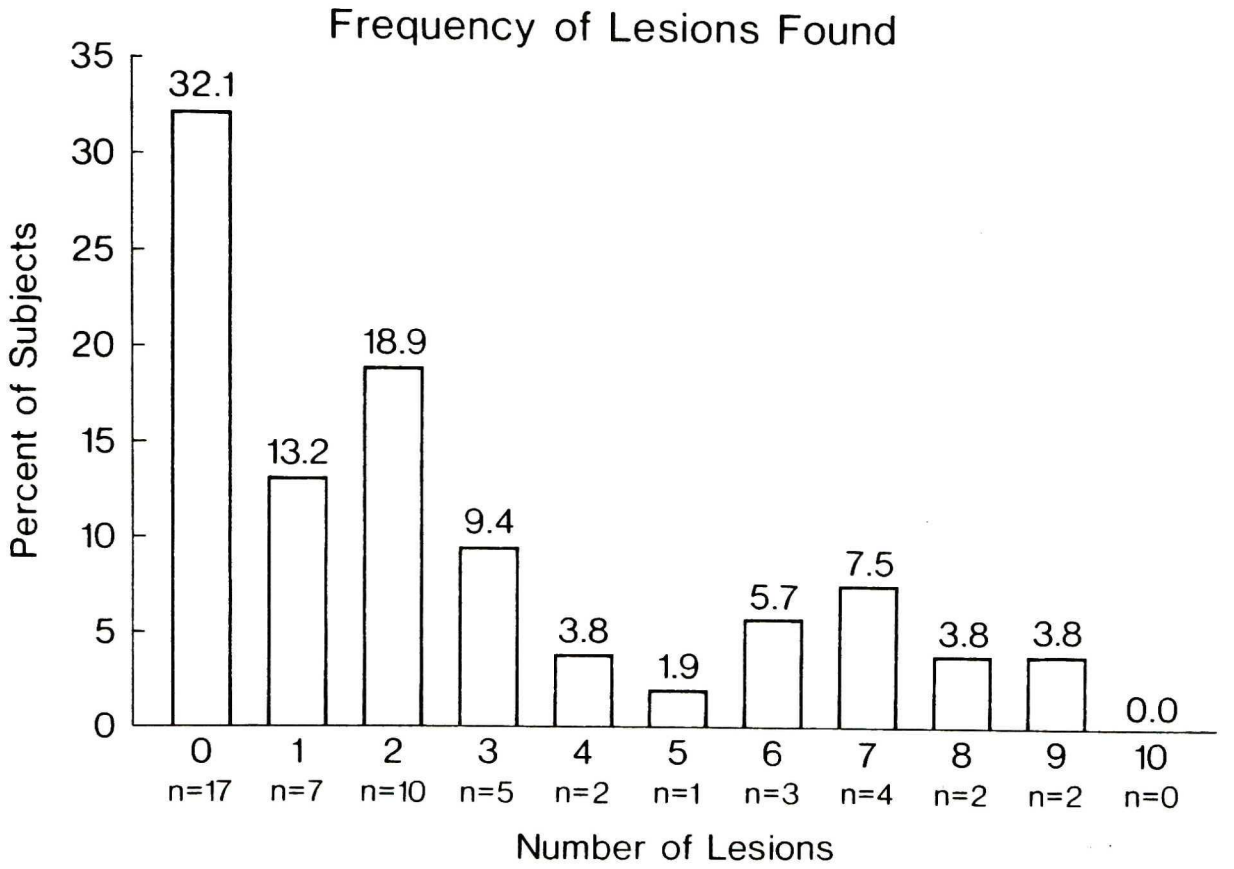

Proposed Predictors of BSE Proficiency
Self-Confidence about Performing BSE
(+)
Belief in the Effectiveness of BSE Technique
(+)
Knowledge of Correct BSE Technique
(+)
Proficient BSE Technique

Frequency of BSE Practice in the Past Six Months



One subject failed to complete this measure.

Figure 4



Datum is missing for one subject.

Appendix A

Study Script

SCRIPT

We would like to invite you to participate in a research project on breast self-examination today. What this study involves is filling out a questionnaire which will take about 20 minutes while you're waiting for your appointment. We also will ask you to perform a practice breast exam on a plastic model/over your clothes. We'll offer you $10 for your participation today.

Would you be interested in participating?

One last thing, it's important that we know why you are seeing the doctor today.

If yes, give informed consent form to participant.

If no, is there any particular reason why you don't wish to participate.

Here's your questionnaire and a pencil. Read this form first (informed consent) and if you have any questions, I'll be over there. My name is .

Subjects indicate they have completed questionnaire.

Have a seat. Do you practice BSE?

If subject answers affirmatively, respond: Great. We'll have you show us on the model/over your clothes.

If no, we'd like you to try out the model/try performing a breast exam over your clothes anyway.

For model subjects:

Position model on table. Move up to the model so that the model is nearly lying against your chest. Make believe that these breasts are your own breasts.

For model and over the clothes subjects:

We want you to show us exactly what you do during a typical breast examination. Show us what behaviors you do in examining your breasts. It's important that you use the same pressure and motion that you normally use. Perform the exam exactly as you would on yourself. You can describe what you're doing as you go along if that helps. Let us know when you're ready to begin and when you finish. If you have any questions, we'll be happy to answer them when you're finished.

No other communication made to subject until end of exam and completion of measures. Two exceptions. If a breast model slips off, assist subject by holding model in place. Here, I'll hold it in place for you. If over the clothes subjects are wearing bulky or restrictive items, would you mind removing your ? If subject stops after examining the first breast and states something to the effect that she does the same thing for the other breast, respond okay, show us what you do.

For model subjects: Did you notice any lumps in either breast? How many? Show me where they are.

For all subjects: I want you to show me how you inspect your breasts in front of a mirror. Point out some object (mirror, yourself, bulletin board) and ask participant to pretend that it's a mirror. Show me what behaviors you use. If it helps you, you can describe what you're doing as you are going along.

Appendix B

Informed Consent Form

CONSENT FORM FOR RESEARCH PARTICIPATION

PLEASE READ CAREFULLY

Study Title: Breast Self-Examination Performance

You are invited to participate in a study today that is part of a research project on breast self-examination. The purpose of this study is to identify factors that lead to good breast self-examination technique and successful detection of breast abnormalities by women using breast self-examination. Participation in this study today involves filling out a short questionnaire & doing a practice breast exam using a breast model or over your clothes.

The questionnaire will take about 15-20 minutes to fill out and asks for your opinions and attitudes about breast self-examination, your current practice and knowledge of breast self-examination, as well as general demographic and health history information. After completing this questionnaire, you will be asked to perform a breast exam as you normally would on yourself. This exam will be done privately and take about 5 to 10 minutes. Two women, who have received special training in breast self-examination techniques, will observe your performance. If you do not practice breast self-examination or are unsure about how to

perform a self-exam, this is your opportunity to learn about breast self-examination as well as help us to help other women learn and feel confident that they can use the technique of breast self-examination to detect breast abnormalities. You will be offered $10 for your participation today. Participation is entirely voluntary and not connected in any way with your use of services at this center. All information collected is strictly confidential and will be examined only by myself and qualified members of my research team. All data collected will remain in my research file. The data will eventually be published in scientific journals but will not be divulged in any manner that can identify you. We will, however, make this information available to you if you wish.

The procedures involved in this study (filling out the questionnaire and doing the practice breast exam) should not entail any discomfort or inconvenience. If, however, you become uncomfortable during the study, you may terminate your participation at any time for any reason without penalty. Although this study does not entail any physical or mental risk, we must inform you at the Department of Defense (DOD) will provide medical care for DOD eligibles (active duty, dependents, and retired military) for physical injury or illness resulting from participation in this DOD approved project. Such care may not be available to other research participants. Compensation may be available through judicial avenues to nonactive duty research participants if

they are injured through negligence (fault of the government.)

If you believe that you have suffered any injury or illness as a result of participation in this research, please contact the Office of Grants Management, 295-3303 at Uniformed Services University. This office can discuss the matter with you and may be able to identify resources available to you. Information about judicial avenues of compensation is available from the University's Legal Counsel, (301) 295-3028.

We welcome your participation in our research and hope that it proves to be an informative and positive experience for you.

YOU ARE MAKING A DECISION WHETHER OR NOT TO PARTICIPATE. YOUR SIGNATURE INDICATES THAT HAVING READ THE ABOVE INFORMATION, YOU HAVE DECIDED TO PARTICIPATE.

_____ _____

Signature of Participant Date

I was present during the explanation referred to above as well as durng the volunteer's opportunity to ask questions. I hereby witness the volunteer's signature.

_____

Signature of Witness

Appendix C

Study Questionnaire

The purpose of this study is to help women learn about breast self-examination. In order to do this we will ask you to do a number of things: answer some questions which ask for demographic information, beliefs about and experience with breast self-examination, and show us how you give yourself a breast exam. We will then give you information about breast self-examination.

age: ____ marital status: ____ number of children: ____

race: _____ religion: _____ occupation _____

highest year of school completed: _____

Check if military: ____ or civilian: _____

military rank: _____ (if military dependent, spouse's rank)

1. Have you ever heard of breast self-examination or BSE before today?

   yes ____ no ____

2. Have you ever been taught how to do a breast exam? yes ____

   no ____

   2a. Who taught you? ____ M.D. ____ nurse ____ friend

   ____ family member (check all that apply)

   2b. How were you taught?

   ____ was given a pamphlet on BSE ____ read an article on BSE ____ was shown a movie on BSE

   ____ was shown how to do BSE using a model ____ was shown how to do BSE over my clothes ____ someone demonstrated BSE to me

   2c. How long ago were you taught BSE? _____

2d. If you were shown how to do a breast exam using a model, describe the model used.

_____

_____

3. Have you ever done a BSE? ____ yes ____ maybe ____ no

3a. What person or event encourage you to try it?

____ mass media ____ friend ____ M.D.

____ nurse ____ pamphlet ____ don't remember

____ nothing in particular

____ other (specify) _____

4. Do you now do BSE on a regular basis? ____ yes ____ maybe ____ no

5. How often have you done a breast exam during the past six months?

never ____ four times ____

once ____ five times ____

twice ____ six times ____

three times ____ seven or more times ____ (____ times)

6. There are several slightly different techniques for doing breast self-examination. We're interested in finding out what women actually do when they do one. We want to know how often you include any of the following steps when you do a self-exam.

If you always do it, you should circle "1." If you include it most of the time, circle "2." Use "3# for sometimes, "4" for hardly ever, and "5" for never.

---

do an exam lying down	1	2	3	4	5
do an exam sitting or standing up	1	2	3	4	5
look at your breasts in the mirror	1	2	3	4	5

examine yourself in the tub or shower	1	2	3	4	5
use the flat pad(s) of your finger(s)	1	2	3	4	5
use one finger in examining your breasts	1	2	3	4	5
use two fingers in examining your breasts	1	2	3	4	5
use three fingers in examining your breasts	1	2	3	4	5
use four fingers in examining your breasts	1	2	3	4	5
use both hands in examinging a breast	1	2	3	4	5
use your whole palm	1	2	3	4	5
use the tip(s) of your fings(s)	1	2	3	4	5
squeeze your nipples	1	2	3	4	5
examine your underarm area	1	2	3	4	5
apply powder to your breast to examine it	1	2	3	4	5
examine your breast with a circular massaging motion	1	2	3	4	5
examine your breasts with a rubbing up and down motion	1	2	3	4	5
examine your breasts with a rubbing side to side motion	1	2	3	4	5
flex your chest muscles in the mirror	1	2	3	4	5
use left hand to examine right breast	1	2	3	4	5
use left hand to examine left breast	1	2	3	4	5
place towel or pillow under head	1	2	3	4	5
place towel or pillow under shoulder	1	2	3	4	5
examine your breasts with your fingers apart	1	2	3	4	5

7. How many minutes do you typically spend doing a breast exam? ____

8. Do you plan you exam for a particular time? ____ yes ____ no

   8a. What time is that? _____?

9. How would you rate your general health?

   ____ excellent ____ good ____ fair ____ poor ____ not sure

10. Indicate by placing a check in the space provided which of the follwing are signs of breast cancer.

   ____ breast thickening

   ____ inverted (turned in) nipples

   ____ orange peel skin

   ____ nipple discharge

   ____ breast area pushes out

   ____ accessory breasts

   ____ hairs around nipple

   ____ breast area that sinks in

   ____ tenderness/pain

   ____ flat nipples

   ____ breast discoloring

   ____ slippery moveable lump

   ____ one breast larger than the other

   ____ hard ridge under both breasts

   ____ nonmoveable lump

11. Have you ever had any of the following?

____ breast biopsy
____ breast aspiration
____ lumpectomy
____ chemotherapy
____ breast cancer
____ friend diagnosed as having breast cancer
____ radiation therapy
____ diagnosis of cancer (other than breast cancer)
____ family member diagnosed as having cancer (other than breast cancer)
____ benign breast cysts or lumps
____ transillumination
____ currently pregnant
____ diagnosis of fibrocystic disease

12. How often do you have your breasts examined by a physician?

____ never
____ once every five years
____ once every four years
____ once every three years
____ once every two years
____ once every year
____ twice per year
____ more than two times each year

How often do you have a mammogram?

____ never
____ once every five years
____ once every four years
____ once every three years
____ once every two years
____ once every year
____ twice per year
____ more than two times each year

How often do you have a thermogram?

____ never
____ once every five years
____ once every four years
____ once every three years
____ once every two years
____ once every year
____ twice per year
____ more than two times each year

13. Indicate by placing a check in the space provided which of the following behaviors are part of a correct breast self-examination.

____ do an exam lying down

____ do an exam sitting or standing up

____ look at your breasts in the mirror

____ examine yourself in the tub or shower

____ use the flat pad(s) of your finger(s)

____ use one finger in examining your breasts

____ use two fingers in examining your breasts

____ use three fingers in examining your breasts

____ use four fingers in examining your breasts

____ use both hands in examining a breast

____ use your whole palm

____ use the tip(s) of your finger(s)

____ squeeze your nipples

____ examine your underarm area

____ examine your breast with a circular massaging motion

____ examine your breasts with a rubbing up-and-down motion

____ examine your breasts with a rubbing side-to-side motion

____ flex your chest muscles in the mirror

____ use left hand to examine right breast

____ use left hand to examine left breast

____ place towel or pillow under head

____ place towel or pillow under shoulder

____ examine your breasts with your fingers apart

1	2	3	4	5	6	7
NOT AT ALL						VERY

14. How frequently do you discuss breast cancer with your friends or family?

1 2 3 4 5 6 7

How likely do you think it is that you will get breast cancer at some time in your life?

1 2 3 4 5 6 7

How effective do you think the available treatments for breast cancer are?

1 2 3 4 5 6 7

If you had breast cancer, how good do you feel your chances for survival are?

1 2 3 4 5 6 7

How confident are you that you know a correct technique for breast self-examination?

1 2 3 4 5 6 7

How confident are you that you could detect small lumps or breast changes?

1 2 3 4 5 6 7

How confident are you that small lumps or breast changes can be found by doing breast self-examination?

1 2 3 4 5 6 7

How embarrassing do you feel breast self-examination is?

1 2 3 4 5 6 7

How frightening do you think breast self-examination is?

1 2 3 4 5 6 7

How comfortable do you feel performing breast self-examination?

1 2 3 4 5 6 7

1	2	3	4	5	6	7
NOT AT ALL						VERY

How confident are you that small breast changes will be found by a physician during a breast examination?

1 2 3 4 5 6 7

How confident are you that small breast changes will be found with a mammogram?

1 2 3 4 5 6 7

____ I don't know what a mammogram is.

How confident are you that you can draw a mental picture of what your breasts look and feel like during a self-exam?

1 2 3 4 5 6 7

How confident are you that you could become familiar enough with your breasts to enable you to draw a mental picture of them?

1 2 3 4 5 6 7

How confident are you that detecting tumors while they are small through regular self-exams can increase a woman's chances of surviving breast cancer?

1 2 3 4 5 6 7

How confident are you that detecting tumors while they are small through regular self-exams can lead to less involved treatment?

1 2 3 4 5 6 7

How confident are you that BSE can be as effective as a physician's breat examination?

1 2 3 4 5 6 7

How difficult do you feel remembering to do BSE is?

1 2 3 4 5 6 7

My fear of developing breast cancer is:

Greater than anything else I fear 1 2 3 4 5 6 7 No fear

15. How strongly do you intend to:

— read pamphlets on breast self-exam?

1 2 3 4 5 6 7

— learn more about breast self-exam?

1 2 3 4 5 6 7

— teach someone you know breast self-exam?

1 2 3 4 5 6 7

— encourage others to perfrom breast self-exam?

1 2 3 4 5 6 7

— practice breast self-exam on a regular monthly basis?

1 2 3 4 5 6 7

— discuss breast self-exam with others?

1 2 3 4 5 6 7

16. Finally, we'd like your opinion on some health matters. Please indicate the extent to which you agree or disagree.

1	2	3	4	5	6
strongly disagree	moderately disagree	slightly disagree	slightly agree	moderately agree	strongly agree

---

Often I feel that no matter what I do, if I am going to get sick, I will get sick.

1 2 3 4 5 6

If I see an excellent doctor regularly, I am less likely to have health problems.

1 2 3 4 5 6

It seems that my health is greatly influenced by accidental happenings.

1 2 3 4 5 6

1	2	3	4	5	6
strongly disagree	moderately disagree	slightly disagree	slightly agree	moderately agree	strongly agree

---

I can only maintain my health by consulting health professionals.

1 2 3 4 5 6

I am directly responsible for my health.

1 2 3 4 5 6

Whatever goes wrong with my health is my own fault.

1 2 3 4 5 6

Health professionals keep me health.

1 2 3 4 5 6

When I stay healthy, I'm just plain lucky.

1 2 3 4 5 6

My physical well-being depends on how well I take care of myself.

1 2 3 4 5 6

When I feel ill, I know it is because I have not been taking care of myself properly.

1 2 3 4 5 6

When I become ill, it's a matter of fate.

1 2 3 4 5 6

Following doctor's orders to the letter is the best way for me to stay health.

1 2 3 4 5 6

If I become sick, I have the power to make myself well again.

1 2 3 4 5 6

I can pretty much stay healthy by taking good care of myself.

1 2 3 4 5 6

1	2	3	4	5	6
strongly disagree	moderately disagree	slightly disagree	slightly agree	moderately agree	strongly agree

---

Other people play a big part in whether I stay healthy or become sick.

1 2 3 4 5 6

When I am sick, I just have to let nature run its course.

1 2 3 4 5 6

The type of care I receive from other people is what is responsible for how well I recover from an illness.

1 2 3 4 5 6

Even when I take care of myself, it's easy to get sick.

1 2 3 4 5 6

17. For each of the following statements, circle the <u>one</u> answer that comes <u>closest</u> to what you believe.

For most illnesses, the care you get when you stay in the hospital is better than you get as an outpatient.	AGREE	DISAGREE
During an injection or a blood test, I usually look <u>away</u> from the arm being used.	AGREE	DISAGREE
I usually don't ask the doctor or nurse many questions about what they're doing during a medical exam.	AGREE	DISAGREE
Except for serious illness, it's generally better to take care of your <u>own</u> health than to seek professional help.	AGREE	DISAGREE
When I think I might be coming down with some illness, I seek out medical help without trying to diagnose myself.	AGREE	DISAGREE
I'd rather have doctors and nurses make the decisions about what's best than for them to give me a whole lot of choices.	AGREE	DISAGREE

Instead of waiting for them to tell me, I usually ask the doctor or nurse immediately after an exam about my health.	AGREE DISAGREE
It is better to rely on the judgments of doctors (who are experts) than to rely on "common sense" in taking care of your own body.	AGREE DISAGREE
Clinics and hospitals are good places to go for help since it's best for medical experts to take responsibility for health-care.	AGREE DISAGREE
Learning how to cure some of your illness without contacting a physician is a good idea.	AGREE DISAGREE
I usually ask the doctor or nurse lots of questions abut the procedures during a medical exam.	AGREE DISAGREE
It's almost always better to seek professional help than to try to treat yourself.	AGREE DISAGREE
It is better to trust the doctor or nurse in charge of a medical procedure than to question what they are doing.	AGREE DISAGREE
Doctors have received too much criticism lately and people should admit that doctors are the experts.	AGREE DISAGREE
The bad thing about clinics and hospitals is that doctors and nurses usually don't allow patients to say much about their treatments.	AGREE DISAGREE
Learning how to cure some of your illness without contacting a physician may create more harm than good.	AGREE DISAGREE
Recovery is usually quicker under the care of a doctor or nurse than when patients take care of themselves.	AGREE DISAGREE
If it costs the same, I'd rather have a doctor or nurse give me treatments than to do the same treatments myself.	AGREE DISAGREE
Programs to teach people to treat themselves will probably result in better heath for the people involved.	AGREE DISAGREE

It is better to rely less on physicians and more on your own common sense when it comes to caring for your body.	AGREE DISAGREE
I usually wait for the doctor or nurse to tell me about the results of medical exam rather than asking immediately.	AGREE DISAGREE
I'd rather be given many choices about what's best for my health than to have the doctor make the decisions for me.	AGREE DISAGREE
For most illnesses, outpatient care is as good as you get by staying in the hospital	AGREE DISAGREE
When I think I know what's wrong with me and a doctor tells me something different, I usually trust what he says.	AGREE DISAGREE
Even if it's allowed, it is better if patients don't look at their medical charts or records.	AGREE DISAGREE
During an injection or a blood-test, I usually look at the arm that is being used.	AGREE DISAGREE

18. Which of the following have a somewhat greater risk for breast cancer? (check all that apply)

____ white women

____ black women

____ oriental women

____ older women

____ women who started menstruating early

____ women with large breasts

____ women with a family history of breast cancer

____ women who were breast fed as infants

____ women who use hormone medications (besides birth control pills)

____ middle aged women

____ younger women

____ women with personal histories of other cancer

____ Protestant women

____ Jewish women

____ women with prior histories of breast cancer

____ women who use birth control pills

____ women who were older at the time of their first full-term pregnancy

____ women who have never had children

____ women who have suffered an injury to the breast

____ women who have had a number of breast X rays.

____ Catholic women

____ women who breast fed their own child

____ women who have been diagnosed as having fibrocystic breast disease

____ women who have sexual partners who fondle their breasts excessively

In the next section, we will ask you to indicate how strongly you feel support from others to practice breast self-examination and other health actions. Circle a number from 1 to 7 to indicate your response. For example, if you do not feel any support at all, you circle "1"; if you feel very supported, you would circle "7," and so forth.

---

1 NOT AT ALL 2 3 4 5 6 7 VERY

How much support do you feel you have

— from your friends	1	2	3	4	5	6	7
— from your mother or other female relatives	1	2	3	4	5	6	7
— from your husband/boyfriend	1	2	3	4	5	6	7
— from your physician(s)	1	2	3	4	5	6	7

to practice breast self-exam?

How strongly do you believe that:

— your friend(s) peform breast self-exam?	1	2	3	4	5	6	7
— your mother or other female relative(s) perform breast self-exam?	1	2	3	4	5	6	7
How strongly do you believe that your husband/boyfriend would help you by reminding you to perform a breast exam?	1	2	3	4	5	6	7

Check the statements that apply to your experience.

____ my doctor examines my breasts

____ my doctor has never mentioned breast self-examination (BSE)

____ there are BSE pamphlets available in my doctor's office for me to take home

____ a nurse told me about BSE

____ a nurse showed me how to do BSE

____ a nurse strongly recommended BSE to me and taught me how to do it.

____ my doctor strongly recommended BSE to me and taught me how to do it.

____ my doctor reminds me to practice BSE

____ my doctor never asks me if I do BSE

____ my doctor has watched me do BSE and given me feedback on my performance.

____ a nurse has watched me do BSE and given me feedback on my performance.

Where do you usually go for a pelvic exam or female problems?

____ outpatient clinic

____ family physician

____ gynecologist

____ emergency room

____ veneral disease clinic

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
1. Being healthy is really important to me.	SD	MD	D	A	MA	SA
2. My health is the thing that matters most to me.	SD	MD	D	A	MA	SA
3. I would rather have my health than anything I can think of.	SD	MD	D	A	MA	SA
4. Good health is the number one priority in my life.	SD	MD	D	A	MA	SA

Appendix D

Behavioral Checklist

APPENDIX D

Rater _____

Subject # _____

BEHAVIORAL CHECKLIST

Arm: same side opposite side

Fingers: one two three four

Fingers: together apart

Hands: one two

Hands: whole palm fingertips and nails flat pad of fingers combination

Thoroughness: quadrants concentric unsystematic

Thoroughness: full breast examined partial breast examined

Motion: circular massaging horizontal/vertical rubbing pinching/plucking combination

Consistency: same motion different motion

Consistency: same starting point different starting point

Total Time _____

Total Number of Lesions Found _____

Location of Lesions Found _____

Comments _____

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